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Modeled Cost-Effectiveness of the Experience Corps Baltimore Based on a Pilot Randomized Trial

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ABSTRACT *The Experience Corps® program was designed to harness the social capital of an aging society to improve outcomes for public elementary schools. The objectives of this article are (1) to model the cost-effectiveness of the Experience Corps Baltimore using data from a pilot randomized trial, including costs, older adults' health status, and quality of life and cost data from the Medical Expenditure Panel Survey, and (2) to describe the relationship between children experiencing increased expected lifetime earnings through improved educational attainment resulting from exposure to the Experience Corps Baltimore volunteers and the program's costs and cost-effectiveness. On average, each quality adjusted life year (QALY) gained by older adults in Experience Corps Baltimore costs $205,000. The lower bound of the 95% confidence interval for the cost-effectiveness is $65,000/QALY. The upper bound is undefined as 15% of the simulations indicated no QALY improvements. If 0.3% of students exposed to the Experience Corps Baltimore changed from not graduating to graduating, the increased lifetime earnings would make the incremental cost-effectiveness ratio $49,000/QALY. If an additional 0.1% changed to graduating from high school, the program would be cost-saving. Using conservative modeling assumptions and excluding benefits to teachers, principals, and the surrounding community, the Experience Corps Baltimore appears expensive for the older adults' health improvements, but requires only small long-term benefits to the target children to make the program cost-effective or cost-saving.*

KEYWORDS *Experience Corps, Cost-effectiveness, Older adults' health status, Children's increased lifetime earnings, Public elementary schools.*

INTRODUCTION

The Experience Corps® was designed to provide opportunities for older adults to give back to their communities. Specifically, older volunteers are involved in high-impact, generative activities to provide help for public elementary schools with attendant moderate physical, social, and cognitive engagement of the volunteers.[1,2] The help is in the form of both human and social capital. A program enhancing positive health behaviors is expected to contribute to health maintenance and successful aging.[3] Results from the small pilot trial conducted by Experience Corps in Baltimore, Maryland, reported in this issue suggest that both older adults and children benefited.[2,4,5] However,

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a rigorous cost-effectiveness analysis is required to determine whether it should be a priority for limited public health and educational resources.[6]

This article has two objectives. First, we model the cost-effectiveness of Experience Corps Baltimore using all costs and older adult health outcomes. Second, we describe the costs and cost-effectiveness of Experience Corps Baltimore considering the relationship between numbers of schoolchildren exposed to the volunteers who might switch from not graduating high school to graduating and experiencing expected lifetime earnings increases. Modeling is necessary for both objectives given the relatively short-term follow-up in the randomized trial and the limited data collected on older adults' medical expenditures and health-related quality of life.

We describe the methods for modeling the cost-effectiveness, detail the results, and discuss the limitations and conclusions. In spite of the contrast between older adults' short-term health improvements and potential cost savings and children's educational and earnings improvements over years or decades, we have combined the results in a single cost-effectiveness analysis to provide coherent policy implications.

MATERIALS AND METHODS

This section describes the calculation of costs, methods of modeling benefits for older adults, and methods of projecting benefits for children necessary to make the program cost-effective. As the general design of the study and short-term outcomes for older adults, children, and schools are discussed elsewhere in this issue,[2,4,5] we provide only a brief description of the study here. Older adults were randomly assigned to participate in the Experience Corps Baltimore or not. Those randomized to participate in the Experience Corps Baltimore made a commitment of 15 hours of volunteer service per week. The program was implemented at three randomly chosen schools of the six in the study. The volunteers in the three schools had roles interacting with kindergarten through third-grade students, including in-class and out-of-class literacy support, behavior management, violence prevention, community outreach, and library support.[2] Study procedures were approved by the Johns Hopkins School of Medicine institutional review board.

Costs of the Experience Corps Program

Administrative records from the Experience Corps Baltimore were used to project the costs of implementing the program at 20 schools. The actual program was implemented at 3 schools in the first year and 6 subsequently. The costs included salaries of supervisory staff, recruitment and training costs, volunteer stipends, and other operating costs. Personnel included a project director and assistant director, budget analyst, data entry personnel, VISTA volunteer coordinator, recruiter, local community liaison, and program administrator. For 20 schools, less than one full-time equivalent (FTE) would be required for the budget analyst, data entry personnel, community liaison, and program administrator. Almost two FTE volunteer coordinators were required. The program costs also include a small stipend for each older adult, payroll taxes, and workers' compensation contributions. Previous research showed that a program targeted to older adults and schoolchildren required a large time commitment (15 hours/week) from a critical mass of older adults (approximately 25 per school) that could not be managed by staff in public schools.[2,4,5] Previous research also demonstrated the need for active recruitment and that older adults' willingness to participate initially was dependent on receiving a stipend to cover expenses.[7]

We included all costs in the cost-effectiveness analysis. To supplement the analysis of older adult outcomes, we described the relationship between extra children changing from not graduating to graduating from high school and experiencing the expected lifetime earnings improvements and the costs and cost-effectiveness of Experience Corps Baltimore.

Although we asked older adults about expenses incurred for transportation, lunch, and supplies related to their involvement in Experience Corps Baltimore, we excluded these from the cost calculation. The stipend, which was included in the cost calculation, was intended to offset the costs rather than represent a wage. Wages are intended to represent a cost to the employer or agency running an intervention that just offsets the opportunity cost of time for the worker. Valuing the opportunity cost of time for older adults is a relatively understudied area of economic evaluation, and the stipend was assumed to cover both expenses and the value of older adults' time as they are choosing to volunteer in Experience Corps rather than undertake other activities. Because the stipend served as a transfer to older adults, counting both the stipend and the costs experienced by older adults would result in double counting.[6]

Budgetary costs were in 2003 dollars. All other monetary figures were inflated to 2003 dollars using the Bureau of Labor Statistics' inflation calculator that uses the standard consumer price index.[8]

Empirical Differences in Health Between Volunteers and Controls

Although older adults' health and health behaviors were assessed,[4] they were not asked extensive questions about medical expenditures or asked questions from an instrument that could be used directly to generate quality adjusted life years (QALYs), which combine quantity and quality of life for a cost–utility analysis.[6] As a result, we needed to use available data to project cost and QALY changes. A limited body of literature suggested a close relationship between self-reported health status and both medical expenditures and health-related quality of life.[9,10] Based on these results, we chose to use self-reported health status to project older adults' outcomes.

The older adults in the pilot study were asked about their self-rated health status at baseline and at the conclusion of 4–8 months of service in the schools or as a member of the control group. Using only data from individuals who reported on their health at both points in time, we calculated the probabilities of changing from each baseline health state to each follow-up health state. These probabilities were used in modeling medical expenditure and QALY changes for the older adults that resulted from their volunteer experience. We were unable to test the significance of differences in transition probabilities between volunteers and controls using multinomial logistic regression or tests other than simulations because there were too few observations.

Efforts to minimize missing data at follow-up were generally successful. We assumed that data were missing at random, although more controls than volunteers failed to respond at follow-up. Most individuals who responded to the follow-up indicated their health status. So the transition probabilities would not bias the results in favor of the volunteers, the missing data could not be systematically related to health status such that the volunteers appear to have excessively favorable transitions.

Simulations of Health Status Over Time

We simulated 500 older adults, representing a critical mass of 25 volunteers at each of 20 schools, as exposed to the Experience Corps Baltimore volunteer program in

comparison with 500 older adults who were identical at baseline, but not exposed to the program. The critical mass of 25 was experience based.[2]

We simulated self-reported health status transitions for 2 years after baseline using a Markov model with random transitions.[11] Health states at the start of the model were drawn randomly based on the distribution of health states among volunteers in the pilot study. We used only the distribution of volunteers as there were no volunteers initially in poor or excellent health, and we wanted to simulate comparing the effects of volunteering with not volunteering for identical volunteer and control populations. Two sets of changes from baseline to the end of the first year were randomly assigned for each observation in a simulation: one based on volunteer transition probabilities and the other based on control transition probabilities. We made the conservative assumption that different transition probabilities would apply only for the first year (i.e., the length of follow-up in the pilot randomized trial). For transitions between the end of the first and second years, we used the observed control transition probabilities for everyone. The simulation was programmed using Visual Basic in Microsoft Excel®[12] and was run 5,000 times to obtain a distribution of cost-effectiveness results.

Incremental Changes Associated With Self-Reported Health States Over Time

As mentioned, we used the health status of the older adults to project medical expenditures and QALYs. We analyzed data from the Medical Expenditure Panel Survey (MEPS) collected by the Agency for Healthcare Research and Quality to estimate the relationships between self-reported health status and medical expenditures and health-related quality of life to project differences between the Experience Corps Baltimore volunteer and control groups.[13]

MEPS data for respondents aged 60 years and older were abstracted from the downloaded year 2000 data set.[14] MEPS respondents were asked about their self-reported health status, health care utilization, and the EuroQol (EQ-5D) questionnaire.[13,15] The downloadable data included total medical expenditures; the EQ-5D scores were obtained from the Agency for Healthcare Research and Quality.

Regression analyses were conducted using survey data commands in Stata 8.0 because of the complex survey design.[13,16] The EQ-5D scores were analyzed using linear regression. Total expenditures were analyzed using a two-part model because of the number of individuals with no expenditures (although this is small in a population aged 60 years and older) and the skewness of the distribution.[17,18] The first part used logistic regression to estimate associations with having any expenditures. The second part used a linear regression to estimate the relationship between the natural logarithm of costs and indicators of health status for those with positive costs. Each regression included dichotomous indicators of self-reported health status levels, with poor as the reference group and adjusted for age and sex. Differences in EQ-5D scores were interpreted directly from estimated coefficients. Previously described techniques were used to transform the results of the two-part model to predict the differences in medical expenditures associated with differences in self-reported health status.[18]

Summation of Costs and QALYs Over Time

Costs of the program incurred during the first year were not discounted. The incremental cost (savings) and QALYs for the 2 years after the volunteer year were discounted at 3% per year.[6] Discounting reduces the value of savings, costs, and QALY changes for which waiting is required. Medical expenditure figures were inflation adjusted to 2003 dollars.

Summarizing Simulations

The results of the 5,000 simulations can be interpreted by examining the incremental cost-effectiveness ratio (ICER) at the mean cost and QALY changes and describing the distribution of simulated results. Each simulation yielded incremental costs (program costs and medical expenditures) and incremental QALYs based on the modeled health status of Experience Corps Baltimore volunteers and controls projected to costs and QALYs using the MEPS regression results.

Two summaries of the simulations are presented. First, the mean incremental costs and QALYs were calculated to generate a policy-relevant point estimate of the ICER.[19] Second, the distribution of simulations was plotted showing combinations of incremental QALY and incremental cost (Figure 1). Such a graph draws attention to the proportion of simulations suggesting a negative change in QALYs and the proportion of simulations below various threshold costs per QALY gained. This graph can also be interpreted with a cost-effectiveness acceptability curve interpretation to assess the proportion of simulations yielding positive net benefits at different values of a QALY.[20]

Children's Educational Attainment and Program Costs and Cost-Effectiveness

We described the relationship between extra children graduating from high school and experiencing expected increased lifetime earnings and the cost and cost-effectiveness of Experience Corps Baltimore, noting the number to make the ICER less than $50,000/QALY and the number to make the program cost-saving. Based on the average number of classrooms (9.8), the number of students per classroom in Baltimore City public schools (20), and a program modeled for 20 schools, 3,920 students would be exposed to volunteers. We did not follow the students long enough to know whether they would have graduated from high school regardless of the Experience Corps Baltimore; however, Baltimore City had graduation rates of only 57.4% in 2003 and 50% at the time of the pilot study.[21] Positive effects of the Experience Corps Baltimore for the students have been documented.[5] A potential long-term benefit would be increased lifetime earnings from graduating from high school rather than dropping out.

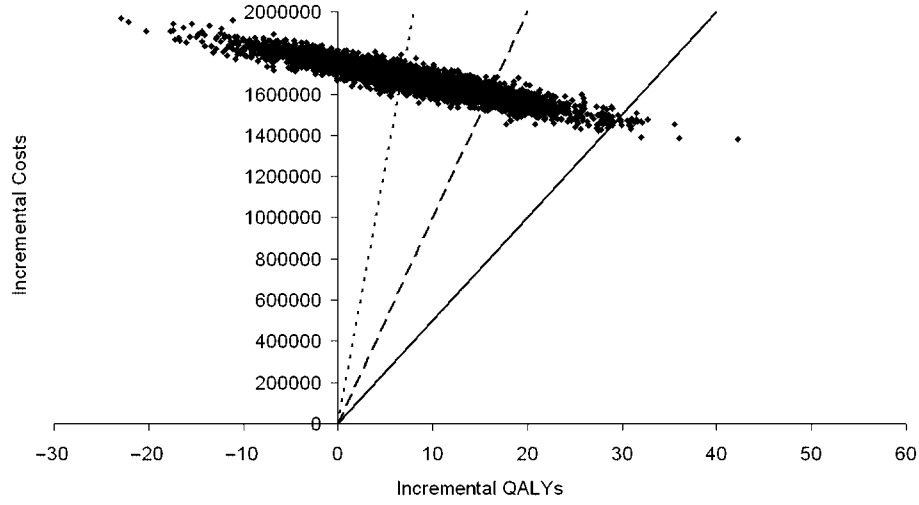

FIGURE 1. Monte Carlo simulation of incremental cost and incremental QALYs.

TABLE 1. Annual operating cost estimates for Experience Corps Baltimore with 25 volunteers in each of 20 schools

Personnel/item	Effort/quantity	Cost
Project director	1 FTE	$49,859
Assistant project director	1 FTE	$45,850
Budget analyst	0.5 FTE	$32,095
Data entry	0.5 FTE	$19,257
Volunteer coordinator	1.66 FTE	$26,095
Recruitment and program data collection	1 FTE	$40,610
Liaison with community	0.75 FTE	$56,985
Program administrator	0.25 FTE	$16,375
Personnel		**$287,160**
Operating costs		**$72,000**
Training costs		**$30,400**
Recruitment costs		**$30,000**
FICA	500 volunteers	$97,200
Workers Compensation	500 volunteers	$19,060
Volunteer support without stipends		**$116,260**
Total without stipend		**$535,820**
Volunteer stipends	500 volunteers	$1,270,500
Total with stipend		**$1,806,320**

Data provided by Experience Corps Baltimore budget analyst. Cost includes fringe benefits as applicable. FTE, full-time equivalent.

Previous research has shown lifetime differences in earnings and differences in earnings over 5-year age intervals for different educational groups in 1999 dollars.[22] We calculated the present value of inflation-adjusted increased lifetime earnings by discounting (accounting for the fact that it will be approximately 18 years until the monetary benefits begin to accrue) using a 3% discount rate. The relationships between the proportion of extra children graduating from high school and overall program costs cost-effectiveness were plotted.

RESULTS

Annual cost estimates for program operations are shown in Table 1. The personnel costs for a 20-school program were $287,000. Other operating, training, and recruiting costs totaled $132,000. The largest cost was volunteer support, specifically volunteer stipends, representing $1.27 million of the $1.8 million total. The cost per volunteer was $3,613. Assuming minimal involvement of 15 hours per week for 36 weeks of an academic year, this translates into total program costs of $7 per hour of volunteer time. As volunteers actually spent an average of 25 hours per week, true costs per volunteer hour were lower.[4]

Table 2 shows transition probabilities for volunteers and controls over the 4–8 months between baseline and the end of the first academic year of service. The probability of decreasing health status is higher for controls than volunteers with fair and good health initially. Control group study subjects with very good health at baseline had a higher probability of dropping to fair than the volunteers, and no one in very good health in the control group improved to excellent health. Among the populations starting in fair or good health, the controls had at least as high a probability of improving.

TABLE 2. Transition probabilities over 4–8 months of volunteering/follow-up

	Final health status					
Initial health status	Poor	Fair	Good	Very Good	Excellent	Initial N
Volunteers (N = 61)						
Poor	0	0	0	0	0	0
Fair	0	0.6	0.4	0	0	5
Good	0	0.02	0.71	0.24	0.02	42
Very good	0	0	0.29	0.64	0.07	14
Excellent	0	0	0	0	0	0
Controls (N = 49)						
Poor	0	0	0	0	0	0
Fair	0.11	0.22	0.66	0	0	9
Good	0	0.08	0.67	0.21	0.04	24
Very good	0	0.08	0.15	0.77	0	13
Excellent	0	0	0	0	1.00	1

Data from pilot randomized trial study subjects.

Additional assumptions were made for the second-period transitions. Because no controls began in poor health, we assumed that the observed probability of an individual in fair health improving by one level would apply to anyone who ended in poor health after the first period. Similarly, because only one individual began in excellent health, we assumed that the probability of decreasing by one or two levels was similar for those in excellent health to what was observed for controls in very good health.

We estimated the relationship between self-reported health status and the probability of any expenditure and the magnitude of expenditures found in the MEPS data. Results of this analysis are not shown because these were needed for the cost-effectiveness calculation and not a main result. The estimated relationships were all in the expected direction. A MEPS respondent aged 60 years or older in fair or good health did not make a statistically significant difference in the likelihood of any medical expenditures, but 95% of all observations in the analysis had positive medical expenditures. All the dichotomous indicators were highly significantly related to the magnitude of positive medical expenditures. Further, all health state indicators were significantly associated with EQ-5D scores at $P < .01$. The findings from the MEPS data analyses were used to project medical expenditures and QALYs for simulated volunteers and controls.

Table 3 summarizes the simulation results. We hypothesized that there would be cost savings and QALY gains for the volunteers (which could occur through less decline) on average, and that 97.5% of the simulations would indicate cost savings and QALY gains. These results show an average medical expenditure savings of nearly $140,000 for 500 volunteers over a 2-year time period, or $273 per volunteer. The average per volunteer QALY improvement relative to being in the control group is 0.02. In 98.7% of the simulations, volunteers had medical care expenditure savings in the first year, and in 95.4% of the simulations, volunteers had expenditures savings over 2 years. For QALY changes, the proportions were 85.8% and 84.9%, respectively. The wide confidence intervals are because of small samples (49 and 61) distributed among 25-cell transition matrixes, leading to the suggestion of improvement with inexact measurement. In no case would the medical expenditure savings over 2 years be sufficient to offset program costs.

TABLE 3. Projected changes in medical expenditures and QALYs of older adults in the Experience Corps Baltimore volunteer program relative to controls

	First-year		Second-year		Two-year	
	Medical expenditure	QALY	Medical expenditure	QALY	Medical expenditure	QALY
Mean	−83,098*	4.43†	−53,634	3.72	−136,734	8.15
2.5 Percentile	−5,168	−3.68	52,186	−5.83	−298,014	−7.43
Median	−82,866	4.42	−54,384	3.68	−136,266	8.25
97.5 Percentile	−163,599	12.61	−158,794	13.76	20,998	23.55

Results were based on data from the pilot randomized trial, MEPS regression analyses, and a simulation programmed in Visual Basic.

*Negative expenditure changes represent expenditure savings for the volunteer group, although positive expenditure changes suggest that the volunteers spend more. Larger negative results are preferred.

†Positive QALY changes represent QALY gains for the volunteer group, although negative QALY changes suggest that the volunteers experienced fewer QALYs. Larger positive results are preferred.

Figure 1 shows the distribution of simulation results combining all costs of the program with medical expenditure savings and plotting these in combination with the QALY changes for the 500 volunteers in each simulation. Of the simulations, 84.9% indicated positive net costs and QALY gains. The remainder indicated positive costs and QALY losses, and they were dominated.

We hypothesized that the Experience Corps Baltimore program would be relatively cost-effective or have an ICER of less than $50,000/QALY gained. The sloped lines indicate $50,000/QALY, $100,000/QALY, and $250,000/QALY moving from right to left. The average expenditure per QALY gained was $205,000, and the median was similar. Less than 1% of the simulations indicated an ICER below $50,000/QALY gained, and the lower bound of the simulated 95% confidence interval was $65,000/QALY. Only 16% of the simulations indicated ICERs below $100,000/QALY, another frequently cited threshold.[23] There is no value of a QALY at which 97.5% of the simulations would yield positive net benefits.

Figure 2 shows the relationship between the additional students graduating from high school (measured as a proportion of the 3,920 modeled) and experiencing expected increased lifetime earnings and the costs and ICER of Experience Corps Baltimore. If only 12 students (0.3%) who would not have graduated otherwise eventually graduate, the ICER would be less than $50,000/QALY gained. If only 3 more students (0.1%) who would not have graduated eventually graduate, the program would be cost-saving. Thus, less than 1 child of the nearly 200 exposed at each school would need to change from not graduating high school to graduating for the Experience Corps Baltimore program to be cost-saving.

DISCUSSION

Experience Corps Baltimore appears to be costly for each QALY gained by older adults without considering further medical expenditure savings for the older adults or lifetime earnings increases for children. With only small changes in the number of students graduating from high school, the program could be highly cost-effective or cost-saving.

Given the many conservative assumptions reviewed below, it is possible that the program is even more likely to be cost-effective than suggested. First, we assumed the benefits of volunteer involvement ended after 1 year, and that long-term participation would not enhance short-term benefits. Although we could not compare nonvolunteering controls with volunteers after 1 year, observational data suggest continued protection from functional decline.[4] Second, we assumed no indirect cost savings from older adults in better health not requiring informal care.[24] Third, we calculated benefits to the children based on increased earnings potential and not other known health and sociocultural benefits associated with higher education.[25] Fourth, we assigned no monetary value to potentially improved retention and performance for teachers.[5] Fifth, we assigned no monetary value to benefits for principals, who might also benefit. Finally, we assigned no monetary value to potential long-term community benefits. If the school improves sufficiently, this could be translated into increased property values and other positive outcomes.[26] Future cost-effectiveness methods research for community-based interventions should focus on the valuation of benefits for those outside the target population.

Several assumptions might bias the results in favor of Experience Corps Baltimore. First, the budgeted costs do not include role development. The investigators and community team members were actively engaged in developing the roles for the older adults that were suggested by principals and that did not overlap with activities performed by paid staff. Given the existence of clearly defined roles at present, money spent on originally developing roles represents sunk costs that do not need to be considered in an analysis of the program's future operations unless additional roles are developed.

A second potentially biasing assumption is that the volunteers' opportunity cost of time is no greater than the stipend. An important opportunity cost would be incurred if the volunteers had been active in other volunteer activities and changed their behavior after volunteering in ways that differed from the control group. Data

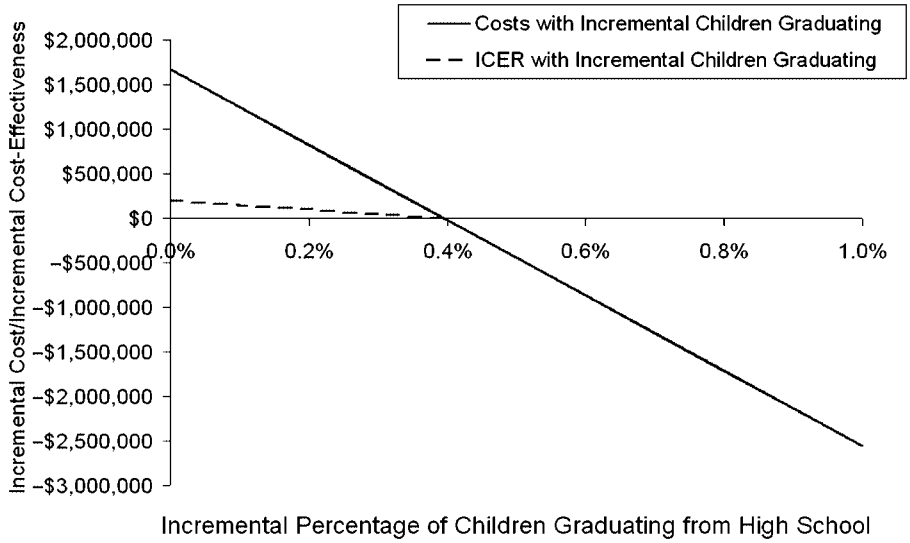

FIGURE 2. Incremental cost and cost-effectiveness ratio (ICER) of Experience Corps Baltimore with incremental children graduating from high school.

not shown suggest that the volunteers and controls similarly changed other volunteer activities.

We also assumed that the program would scale up from the 6 schools in which it was implemented to 20 schools with a linear increase in costs. When scaling up, the costs per school may be lower or higher. The latter would occur if, for example, there were a need for more complex management information systems as the program grows.

The results should be considered tentative because the simulation was based on 25-cell transition matrices for which the data came from 61 volunteers and 49 controls. The cost, effectiveness, and cost-effectiveness confidence intervals were all wide, although the average indicates that the Experience Corps Baltimore program is relatively cost-effective.[27] Further research with a larger number of study subjects and direct measurement of medical expenditures and QALYs could increase the precision of the findings.

Although the proximity of health status improvement and other outcomes for older adults makes it possible to gather data directly on older adults' benefits, the need to wait a decade to determine whether the children are more likely to achieve higher educational attainment forces us to model the children's outcomes in cost-effectiveness analyses. Results from the High/Scope Perry Preschool study and Chicago Longitudinal study of the effects of early preschool programs, which show long-term benefits of early interventions for children, lend credibility to modeling long-term outcomes for children.[28,29]

The experience in Baltimore may not generalize without careful consideration of local conditions. First, the very low starting point for high school graduation leaves more students who can gain. However, because less than 1% of students would need to change from not graduating to graduating, all school systems have the potential to improve this small amount. Second, Baltimore is a moderate-size urban area perceived to offer limited opportunities for older adults to participate in high-impact, generative activities. The availability of generative activities and the roles that are developed might vary. If generativity is both the "hook" to get and keep people involved in a program of moderate physical, cognitive, and social activity and an important contributor to the improvements in health-related quality of life,[30] then it is important to consider how the generative opportunities are created, what they involve, and the related costs.

The recruited volunteers and roles developed spanned a range of capacities. Health status transitions suggested that older adults in moderate health were protected from decline.[4] This program was designed to benefit and benefit from older adults of all capacities. However, future research and policy might focus on targeting specific populations for which the intervention is most cost-effective.

Future policy development depends on political support for a program that may be cost-effective based on long-term results with dispersed costs and benefits. Experience Corps Baltimore may affect Medicare and Medicaid payments, the functioning of classrooms and schools, and the long-term economic and social productivity of students. Local, state, and federal governments all pay for education and health care and have an interest in enhancing the productivity and satisfaction of their constituents. Although a government agency or other source would have to pay the stipends and other program costs, many of the benefits come from general economic and earnings improvement. Finding ways to integrate funding agencies that usually focus on programs for either older adults or children may make programs with disparate costs and benefits more politically palatable.

In conclusion, this article provides a rigorous cost-effectiveness analysis of a pilot study of a community-based program. We modeled inexact short-term effects and made conservative assumptions about uncertain long-term effects. The limitations provide insight into improvements necessary to evaluate thoroughly conceptually sound community-based programs with diverse constituencies, funders, and beneficiaries. As other analyses in this issue support the hypotheses of improvements for older adults and children,[4,5] the simulation to summarize costs and benefits for policy discussion is important in spite of the remaining limitations. Cost-effectiveness will be a necessary criterion for making the case for intergenerational programs in the aging society of the future.

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REFERENCES

1. Erikson EH. *The Life Cycle Completed: a Review*. New York: WW Norton; 1982.
2. Glass TA, Carlson M, Hill J, et al.. Experience Corps Baltimore: design of an intergenerational health-promotion program to boost social capital. *J Urban health*. 2004;81(1):94–105.
3. Rowe JW, Kahn RL. Successful aging. *Gerontologist*. 1997;37:433–440.
4. Fried LP, Carlson M, Freedman M et al. A social model for health promotion for an aging population: initial evidence on the Experience Corps Baltimore model. *J Urban health*. 2004;81(1):64–78.
5. Rebok GW, Glass TA, Carlson M et al. Effects of Experience Corps Baltimore participation on young children, teachers, and schools: results from a randomized pilot trial. *J Urban health*. 2004;81(1):79–93.
6. Gold MR, Siegel JE, Russell LB, Weinstein MC, eds. *Cost Effectiveness in Health and Medicine*. New York: Oxford University Press; 1996.
7. Freedman M, Fried L. Launching Experience Corps: Findings From a 2-Year Pilot Project Mobilizing Older Americans to Help Inner-City Elementary Schools. Oakland, CA: Civic Ventures; January 1999.
8. Inflation calculator Web site. Available at: http://data.bls.gov/cgi-bin/cpicalc.pl. Accessed September 28, 2003.
9. Bierman AS, Bubolz TA, Fisher ES, Wasson JH. How well does a single question about health predict the financial health of Medicare managed care plans? *Eff Clin Pract*. 1999;2(2):56–62.
10. Rizzo JA, Pashko S, Friedkin R, Mullahy J, Sindelar JL. Linking the health utilities index to National Medical Expenditure Survey data. *Pharmacoeconomics*. 1998;13:531–541.
11. Simon CP, Blume L. *Mathematics for Economists*. New York: WW Norton; 1994.
12. Wells W, Harschbarger S. *Microsoft® Excel 97 Developer's Handbook*. Redmond. WA: Microsoft Press; 1997.
13. Agency for Healthcare Research and Quality Center for Cost and Financing Studies. *MEPS HC-050: 2000 Full Year Consolidated Data File*. 2003.
14. Medical Expenditure Panel Survey Web site. Available at: http://www.meps.ahrq.gov/Puf/DataResultsData.asp?ID=130. Accessed September 29, 2003.

15. Dolan P. Modeling valuations for EuroQol health states. *Med Care*. 1997;35:1095–1108.
16. *Stata Statistical Software: Release 8.0*. College Station, TX: Stata Corporation; 2003.
17. Mullahy J. Much ado about two: reconsidering retransformation and the two-part model in health econometrics. *J Health Econ*. 1998;17:247–281.
18. Ai C, Norton EC. Standard errors for the retransformation problem with heteroscedasticity. *J Health Econ*. 2000;19:697–718.
19. Claxton K. The irrelevance of inference: a decision-making approach to the stochastic evaluation of health care technologies. *J Health Econ*. 1999;18:341–364.
20. Briggs AH, O'Brien BJ, Blackhouse G. Thinking outside the box: recent advances in the analysis and presentation of uncertainty in cost-effectiveness studies. *Annu Rev Public Health*. 2002;23:377–401.
21. Report Card 2003 Web site. Available at: http://msp.msde.state.md.us/gradrate.asp?K=30AAAA. Accessed September 28, 2003.
22. Day JC, Newburger EC. *The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings*. Washington, DC: US Census Bureau; 2002. P23-210.
23. Hirth RA, Chernew ME, Miller E, Fendrick AM, Weissert WG. Willingness to pay for a quality-adjusted life year: in search of a standard. *Med Decis Making*. 2000;20:332–342.
24. LaPlante MP, Harrington C, Kang T. Estimating paid and unpaid hours of personal assistance services in activities of daily living provided to adults living at home. *Health Serv Res*. 2002;37:397–415.
25. Murrell SA, Meeks S. Psychological, economic, and social mediators of the education-health relationship in older adults. *J Aging Health*. 2002;14:527–550.
26. Weimer DL, Wolkoff MJ. School performance and housing values: using non-contiguous district and incorporation boundaries to identify school effects. *Natl Tax J*. 2001;54:231–253.
27. Tengs TO, Adams ME, Pliskin JS, et al. Five-hundred life-saving interventions and their cost-effectiveness. *Risk Anal*. 1995;15:369–390.
28. Weikart DP. Changing early childhood development through educational intervention. *Prev Med*. 1998;27:233–237.
29. Reynolds AJ, Temple JA, Robertson DL, Mann EA. Long-term effects of an early childhood intervention on educational achievement and juvenile arrest: a 15-year follow-up of low-income children in public schools. *JAMA*. 2001;285:2339–2346.
30. Carlson MC, Seeman T, Fried LP. Importance of generativity for healthy aging in older women. *Aging (Milano)*. 2000;12:132–140.