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Measuring The Lifetime Costs Of Serious Mental Illness And The Mitigating Effects Of Educational Attainment

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ABSTRACT Serious mental illness (SMI) is a disabling condition that develops early in life and imposes substantial economic burden. There is a growing belief that early intervention for SMI has lifelong benefits for patients. However, assessing the cost-effectiveness of early intervention efforts is hampered by a lack of evidence on the long-term benefits. We addressed this by using a dynamic microsimulation model to estimate the lifetime burden of SMI for those diagnosed by age twenty-five. We estimated that the per patient lifetime burden of SMI is $1.85 million. We also found that a policy intervention focused on improving the educational attainment of people with SMI reduces the average per person burden of SMI by $73,600 (4.0 percent)—a change driven primarily by higher lifetime earnings—or over $8.9 billion in reduced burden per cohort of SMI patients. These findings provide a benchmark for the potential value of improving educational attainment for people with SMI.

Serious mental illness (SMI)—collectively made up of psychoses, major depressive disorder, and bipolar disorder—is one of the most disabling health conditions. The estimated per patient economic burden from SMI is high, similar to other health conditions such as cancer and diabetes.[1] Moreover, the lifetime patient burden is augmented by the comparatively young age of onset, with the median age of diagnosis ranging from fifteen to thirty.[2,3] Consequently, SMI can affect all parts of a person's life, including health care costs, educational attainment, work productivity, employment status, and life expectancy. Previous reports show that SMI is associated with a median of ten years of potential life lost, with estimates ranging as high as more than thirty years lost,[4] and $16,000 (in 2002 dollars) in reduced earnings annually.[5] Also, people with SMI experience higher academic dropout rates, and their educational attainment is lower than that of the general population.[6]

There has been a growing emphasis on the early identification, diagnosis, and treatment of SMI.[7] Experimental treatment strategies incorporate interdisciplinary, patient-centered interventions early on to address comorbidities (for example, substance use disorders) and personal issues that can impede improvement of SMI symptomology (such as housing, relationships, education, and employment).[7] Clinical trials have shown the benefit of early interventions in improving health, education, employment, and other outcomes.[8,9] For example, early intervention via illness and medication management, family psychoeducation, and education or employment support in the Recovery After an Initial Schizophrenia Episode Early Treatment Program (RAISE-ETP) improved quality of life and reduced depression symptoms, with larger effects in patients with shorter duration of untreated psychosis.[8] Early interventions increased academic enrollment, course completion, and employment measures in people with SMI[10–12] and adolescents in general.[13] Educational attainment may also be increased by interventions that delay the onset of mental disorders and thereby increase the opportunity for a person to obtain a degree.[14]

Based on these findings, intervention strategies that result in higher educational attainment or increased employment could improve the quality of life and reduce the lifetime burden of people with SMI, and such strategies are being actively explored by policy makers in the US.[15] Despite these efforts, implementation of effective early interventions may be hindered by limited evidence of long-term return on investment, as program evaluations generally do not assess intervention benefits across a patient's life span.[16] This lack of evidence makes it impossible to fully assess the long-term cost-effectiveness of early interventions for SMI. We attempted to fill that gap by providing new data on the lifetime benefits of improving educational or employment outcomes for people who experience SMI early in life. Specifically, we used a microsimulation model to project the impact on health and economic outcomes of successfully increasing educational attainment for people diagnosed with SMI by age twenty-five.

Study Data And Methods

We simulated the lifetime outcomes of people with and without SMI using the Future Americans Model (FAM), a dynamic microsimulation model that uses longitudinal data on Americans ages twenty-five and older to project health, medical spending, social service use, and economic outcomes over time. Similar to its precursor, the Future Elderly Model, the FAM constructs estimates based on the trajectories of individual health and economic outcomes rather than on average cohort-level characteristics. This allows for more accurate estimations based on subgroup analyses and spillover effects between different individual characteristics. Both models have been used to measure the economic burden of health conditions such as cancer, diabetes, and obesity and to simulate the long-term effects of scenarios such as delayed aging, reduced disability rates, medical innovation, and an early childhood intervention.[17–20]

FUTURE AMERICANS MODEL Here we briefly sketch the data and methods used in the FAM (considerably more detail is available in online appendix C).[21] The FAM combines data from several large, nationally representative surveys: the Panel Study of Income Dynamics (PSID), the Health and Retirement Study (HRS), the Medical Expenditure Panel Survey (MEPS), and the Medicare Current Beneficiary Survey (MCBS). The PSID and HRS are both longitudinal surveys that track people over time. The FAM uses the PSID to track people from age twenty-five and uses the HRS to track people with identical characteristics from age fifty-one and older. MEPS provides information on health care spending. These data were used to estimate transitions between health states, project health care spending, and assess quality of life for the simulations.

We used the FAM to conduct cohort simulations following a representative cohort of Americans ages twenty-five and older until death under different scenarios, comparing people with a self-reported diagnosis of SMI by age twenty-five to those without a diagnosis of SMI by age twenty-five (including those diagnosed later in life). First, the FAM calculates transition probabilities for specified health states, including chronic disease incidence, functional status, body mass index, and mortality. Transition probabilities are modeled as first-order Markov processes, with probabilities based on predicted values from probit regressions (predictors include age, sex, education, race, health conditions, body mass index, and functional status). The health conditions are derived from answers to PSID questions, with chronic health conditions treated as absorbing states (that is, once people report being diagnosed with such a condition, they are considered to have that condition until death). This approach is consistent with the PSID and HRS questionnaires, which ask whether respondents were ever diagnosed with a condition rather than whether they currently have it.

For this project we incorporated questions in the PSID about mental illness. Specifically, we identified a person as having SMI if they reported having been diagnosed with psychosis, bipolar disorder, or depression by age twenty-five. Because major depressive disorder was not specified, we included people only if they reported depression with another comorbid mental health condition (for example, anxiety disorder) to focus on more severe cases. This is consistent with prior research showing that self-reports of depression in conjunction with other mental health conditions are reliable proxies for major depressive disorder.[22,23] Appendix table A3 shows that this approach yielded a conservative estimate of the burden of SMI.[21] To focus on early-onset cases, we compared people who were diagnosed with SMI by age twenty-five to those who were not.

While chronic conditions, including SMI, are considered absorbing states, we allowed for transitions in terms of functional status and body

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mass index. Functional status was measured by limitations to activities of daily living, and we considered people disabled if they reported having at least one limitation or living in a nursing home. Given the focus on SMI, we also incorporated the score on the Kessler Psychological Distress (K6) Scale, a validated population screening tool for mental health problems administered in the PSID.[24] The PSID reports the K6 score based on an assessment of the previous thirty days; we allowed the score to vary over time to capture variability in SMI symptoms.

We next projected individual health care spending and economic outcomes based on health transitions, functional status, body mass index, K6 score, and demographics. In this stage we used MEPS to provide complementary data on medical spending. Economic outcomes included employment status, total annual earnings, and disability claims for Social Security Disability Insurance (SSDI) or Supplemental Security Income (SSI). These were estimated by regressing spending on risk factors, health, and functional status (dollar values are reported in 2017 dollars, with future dollars discounted using a 3 percent rate). We predicted quality-adjusted life-years using the EQ-5D, a quality-of-life index estimated from MEPS based on five variables indicating mobility, daily activities, self-care, anxiety, depression, and pain. Specifically, we used regression to predict EQ-5D scores as a function of health conditions and functional status.

SIMULATION SCENARIOS We simulated outcomes for people with and without a diagnosis of SMI by age twenty-five, comparing them under two scenarios. The first was the status quo, which provided an estimate of the current lifetime burden of SMI across a wide range of outcomes. Furthermore, we compared outcomes for people with and without SMI according to educational attainment, to demonstrate whether education has a protective effect on the adverse lifetime outcomes for people with SMI. While the PSID provides detailed information on years of education, which we used in our simulation model, we report three categories of educational attainment for ease of interpretation: less than a high school education, a high school education, and more than a high school education.

The second scenario, or the improved education scenario, simulated the effect of extending the RAISE-ETP trial to all patients with onset of SMI by age twenty-five. We extrapolated from the RAISE results—which found a 5.9-percentage-point increase in school participation at twelve months and an 8.3-percentage-point increase after twenty-four months for patients at treatment sites compared to control sites—to estimate the impact of increasing years of education for people with SMI.[10] Consistent with these results, in the model we implemented the intervention by increasing baseline years of education for people with SMI by age twenty-five by one year; we capped the improvement in education at a college degree. Appendix B provides a detailed description of the implementation of the intervention.[21]

The burden of early-onset SMI is large, but improved educational outcomes can greatly reduce that burden.

DETAILS OF THE TRIAL RAISE-ETP was a large, randomized controlled trial that focused on intervening with relatively young patients (ages 15–40) in real-world treatment settings and measured improvements in mainstream education and competitive employment. Treatment sites in RAISE-ETP provided a range of services at existing community clinics including family education, resiliency training, supported employment and education, and individualized medication treatment plans.[25] In addition, RAISE-ETP did not dictate a specific intervention but provided a manual for guidance for patients and providers to develop individualized treatment plans and goals. Among the treatments used to improve educational outcomes were enrollment assistance, consultations to discuss accommodations, the teaching of study skills, and ongoing performance meetings with teachers.[26] Given the flexible, cost-conscious nature of the intervention, assessing the lifetime impact of such a scenario provides important insight into the value of intervening to reduce the burden of SMI.

We also conducted scenarios that simulated improved workforce participation based on RAISE-ETP (see appendix B).[21] This included an improved employment scenario that increased baseline earnings for patients consistent with RAISE-ETP, as well as a combined improved employment and education scenario that applied the estimated effects of both the supported employment and education interventions.

LIMITATIONS Our study had several limitations. Some limitations are inherent to all microsimulation models, which rely on multiple data sets and estimation techniques that are subject to potential error, but which nonetheless are widely used and have been validated extensively.

Also, while we modeled our intervention on the findings of a real-world experiment, the intervention is still hypothetical. The findings of RAISE-ETP, which was focused on first-episode psychosis, might not be generalizable to the full cohort of people with SMI by age twenty-five. Nevertheless, we interpret our scenario as providing a plausible estimate of the effect of a comprehensive, community-based intervention targeting educational attainment for people with SMI.

Another limitation is that we relied on individual self-reports of an SMI diagnosis by age twenty-five, which could be subject to bias.

Still another is that the PSID samples people only if they form a household, meaning that we might have missed cases of SMI that were so severe early on that they prevented people from ever forming a household. We also did not capture incarceration, homelessness, or institutionalization, such as long-term hospitalization associated with SMI. In appendix D we present the results of benchmarking our SMI prevalence numbers to those in the literature and provide a detailed accounting of the populations we might have missed because of the PSID survey design.[21] All of this suggests that the economic burden numbers we estimated, large as they are, are likely conservative, as there are elements of societal costs that we failed to capture.

Despite these limitations, we believe that our findings provide a benchmark for the costs suffered by people with SMI and the potential gains from improving their educational attainment.

Study Results

In a single year of data for our simulation, approximately 6.2 percent of people reported having ever been diagnosed with SMI, and 2.7 percent reported having been diagnosed by age twenty-five. Of those with SMI by age twenty-five, 11.9 percent were diagnosed with psychosis, 55.1 percent with bipolar disorder, and 66.6 percent with major depression. Those with an SMI diagnosis by age twenty-five had lower educational attainment. About 23.4 percent of people with SMI by age twenty-five had less than a high school diploma, 55.0 percent had only a high school diploma, and 21.7 percent had at least some college, compared to 11.3 percent, 53.7 percent, and 35.1 percent, respectively, for those who never developed SMI. Those with SMI were also more likely to be female and white and to have more restrictions to activities of daily living (see appendix table A1 for the full set of sample characteristics).[21]

Based on our simulations, SMI substantially worsens lifetime health outcomes, raises lifetime medical costs, and reduces lifetime economic outcomes: People with SMI by age twenty-five had an average life expectancy from age twenty-five of 45.7 years—10.4 years (19 percent) lower than those without SMI by age twenty-five (exhibit 1). Similarly, disability-free and quality-adjusted life-years were 51 percent and 24 percent lower, respectively. Total lifetime medical spending was $96,500 (24 percent) higher, even though people with SMI are much more likely to be on Medicaid or uninsured. The impact on labor earnings was especially pronounced, with the cohort with SMI by age twenty-five earning $537,100 (48 percent) less per person, on aver-

EXHIBIT 1

Expected lifetime health and economic outcomes by whether or not people had serious mental illness (SMI) by age 25

Lifetime outcomes from age 25	No SMI by age 25	SMI by age 25	Absolute difference	Percent difference
Life expectancy (years)	56.1	45.7	−10.4	−19
Disability-free life-years	42.3	20.6	−21.7	−51
Quality-adjusted life-years	47.6	36.0	−11.6	−24
Total medical spending (1,000s of 2017 $)	399.3	495.9	96.5	24
Lifetime earnings (1,000s of 2017 $)	1,122.3	585.2	−537.1	−48
Years worked	32.6	17.8	−14.8	−45
Full-time years worked	23.8	10.6	−13.2	−55
Lifetime SSDI payments (1,000s of 2017 $)	7.8	46.6	38.8	500
Lifetime SSI payments (1,000s of 2017 $)	2.5	22.9	20.3	809

SOURCE Authors' analysis of data for 1999–2015 from the Panel Study of Income Dynamics, for 1998–2012 from the Health and Retirement Study, for 2001–03 and 2007–10 from the Medical Expenditure Panel Survey, and for 2007–10 from the Medicare Current Beneficiary Survey. **NOTES** The exhibit shows expected outcomes from age twenty-five until death, based on simulations from the Future Americans Model. SMI includes psychosis, bipolar disorder, and major depression. SSDI is Social Security Disability Insurance. SSI is Supplemental Security Income.

age, and having 13.2 (55 percent) fewer years of full-time work. Not surprisingly, this corresponded to increases of 500 percent and 809 percent, respectively, in lifetime benefit payments from SSDI and SSI.

The association between SMI and average outcomes was not uniform across all people with a diagnosis. Rather, it varied according to educational attainment, as shown in exhibit 2. In most cases, outcomes improved with higher educational attainment for people with and without SMI by age twenty-five. Life expectancy, quality of life, earnings, and years of employment were higher, and SSDI and SSI payments were lower, for those with at least some college compared to those without a high school diploma in both cohorts. The one exception was medical spending, which increased with education for both cohorts—likely as a result of improved life expectancy. Similarly, the effect of SMI varied by sex. As shown in appendix table A2, women diagnosed with SMI by age twenty-five faced a higher relative and absolute burden than did men.[21]

While outcomes for those in the SMI cohort were better with more education, people with SMI by age twenty-five still lagged behind similarly educated people without an early SMI diagnosis. Life expectancy, disability, and quality of life for a person with SMI by age twenty-five who had at least some college or a college degree were most comparable to those for a person in the cohort without an early diagnosis and with just a high school diploma (exhibit 2). People in the SMI cohort without a high school diploma had by far the worst outcomes on average: just 38.6 years of life expectancy after age twenty-five, $471,500 in lifetime medical costs, and just $192,900 in lifetime earnings and 4.7 years of full-time work. The partial mediating effect of educational attainment on the burden of SMI raises the question of how much of the burden can be mitigated by improving educational attainment for people with SMI.

EXHIBIT 2

Expected lifetime health and economic outcomes for people with and without serious mental illness (SMI) by age 25, by educational attainment

Lifetime outcomes from age 25	Less than high school education	High school education	More than high school education
WITHOUT SERIOUS MENTAL ILLNESS			
Life expectancy (years)	49.6	54.8	60.1
Disability-free life-years	33.4	40.2	47.9
Quality-adjusted life-years	40.9	46.1	51.8
Total medical spending (1,000s of 2017 $)	344.9	383.8	441.7
Lifetime earnings (1,000s of 2017 $)	500.3	907.0	1,639.7
Years worked	24.0	31.7	36.4
Full-time years worked	16.1	23.1	27.0
Lifetime SSDI payments (1,000s of 2017 $)	16.1	9.0	3.4
Lifetime SSI payments (1,000s of 2017 $)	9.8	2.5	0.6
WITH SERIOUS MENTAL ILLNESS			
Life expectancy (years)	38.6	44.7	49.4
Disability-free life-years	12.4	19.1	24.6
Quality-adjusted life-years	28.6	34.9	39.7
Total medical spending (1,000s of 2017 $)	471.5	478.8	535.4
Lifetime earnings (1,000s of 2017 $)	192.9	491.3	954.0
Years worked	9.1	17.6	23.0
Full-time years worked	4.7	10.5	13.9
Lifetime SSDI payments (1,000s of 2017 $)	71.8	50.7	28.8
Lifetime SSI payments (1,000s of 2017 $)	49.1	22.6	5.0

SOURCE Authors' analysis of data for 1999–2015 from the Panel Study of Income Dynamics, for 1998–2012 from the Health and Retirement Study, for 2001–03 and 2007–10 from the Medical Expenditure Panel Survey, and for 2007–10 from the Medicare Current Beneficiary Survey. **NOTES** The exhibit shows expected outcomes from age twenty-five until death, based on simulations from the Future Americans Model. SMI includes psychosis, bipolar disorder, and major depression. SSDI is Social Security Disability Insurance. SSI is Supplemental Security Income.

Under the improved education scenario, life expectancy and disability-free and quality-adjusted life-years increased by 0.7 percent, 1.9 percent, and 0.8 percent, respectively (exhibit 3). There was a small increase in medical spending (0.2 percent), but lifetime earnings increased by 7.0 percent, and SSDI and SSI payments decreased by 1.7 percent and 13.5 percent, respectively. These effects reflect average increases across all patients with early-onset SMI. Under the improved education scenario, only 12.8 percent had improved educational attainment (for example, going from some college to a college degree) (data not shown). As a result, the magnitude of these improvements in outcomes was much higher among those patients "treated" by the improved education scenario than among the full cohort of people with SMI by age twenty-five.

We estimated that early-onset SMI imposed a total economic burden of $1,852,800 per person (exhibit 4). The largest component of the burden (about 63 percent) came from the value of quality-adjusted life-years lost—which accounted for $1,160,000 per person—followed by lost earnings (29 percent). The direct cost of medical spending was relatively low, accounting for 5 percent of the burden. Across the entire cohort of people with SMI by age twenty-five, the average per person burden fell by $73,600 (4.0 percent) under the improved education scenario.

Discussion

There is a growing emphasis on early identification and treatment of patients with mental illness in the US, with the hope that intervention could help improve their long-term health and economic outlooks. However, efforts to implement these programs on a wider scale have been hampered by a lack of clear evidence on their value or long-term cost-effectiveness. In this study we simulated differences in life expectancy, quality of life, medical spending, and economic outcomes for a representative cohort of people from age twenty-five through death, according to whether or not they had a diagnosis of SMI by age twenty-five. We found that early-onset SMI is associated with substantially worse lifetime outcomes, including ten fewer quality-adjusted life-years, 24 percent higher medical spending, and 48 percent lower earnings. All told, these worse outcomes lead to more than $1.85 million per patient in lifetime economic burden.

To put these findings in perspective, data from the Census Bureau suggest that the cohort of twenty-five-year-olds in the US in 2017 included approximately 4.5 million people, about 2.7 percent of whom would be expected to have ever had an SMI diagnosis based on our data. This suggests that the entire cohort of new patients could be expected to experience about $225 billion in economic burden over the course of their lives. Note that the bulk of this estimate comes from valuing reductions in quality-adjusted life-years. While this provides a straightforward method for calculating the total burden, it should be noted that as a result, society might not be able to fully recoup the burden of SMI in the same way that it could directly recoup reduced spending on SSI and SSDI.

While improving the educational attainment of people with SMI has clear economic benefits, such an intervention is costly. The RAISE-ETP trial was estimated to cost approximately $34,224 for twenty-four months of treatment, compared to $26,876 for twenty-four months of status quo community care.[27] These costs included not only the provision of supported education and employment but also medications, health care use, and staff training. Our findings indicate that there was a reduction in lifetime per person burden of SMI of $73,600 associated with the educational outcomes of the RAISE-ETP trial. Aggregated to the cohort of current twenty-five-year-olds with likely SMI, those savings would total $8.9 billion. Providing a similar two-year intervention to the full cohort would cost approximately $4.2 billion, which implies a more than two-to-one return on investment. Assuming that even a fraction of these patients are already accessing mental health services, that could be an overestimate of the cohort-level cost. Conversely, an important feature of RAISE-ETP was that it relied on existing community sources of care to limit costs. Scaling up to the population level would probably require additional resources.

We also showed that a significant fraction of economic burden—particularly the lost economic productivity—was associated with worse educational attainment for people with SMI. While improving education does not appear to be sufficient to eliminate the economic burden of

EXHIBIT 3

Expected lifetime health and economic outcomes for people with serious mental illness (SMI) by age 25, in the status quo or under the improved education scenario

		Improved education scenario	
Lifetime outcomes from age 25	**Status quo**	**Absolute change**	**Percent change**
Life expectancy (years)	45.7	0.3	0.7
Disability-free life-years	20.6	0.4	1.9
Quality-adjusted life-years	36.0	0.3	0.8
Total medical spending (1,000s of 2017 $)	495.9	1.1	0.2
Lifetime earnings (1,000s of 2017 $)	585.2	40.9	7.0
Years worked	17.8	0.7	3.9
Full-time years worked	10.6	0.5	4.7
Lifetime SSDI payments (1,000s of 2017 $)	46.6	−0.8	−1.7
Lifetime SSI payments (1,000s of 2017 $)	22.9	−3.1	−13.5

SOURCE Authors' analysis of data for 1999–2015 from the Panel Study of Income Dynamics, for 1998–2012 from the Health and Retirement Study , for 2001–03 and 2007–10 from the Medical Expenditure Panel Survey, and for 2007–10 from the Medicare Current Beneficiary Survey. **NOTES** The exhibit shows expected outcomes from age twenty-five until death, based on simulations from the Future Americans Model. The improved education scenario increases the educational attainment of people with SMI consistent with the results of the Recovery After an Initial Schizophrenia Episode Early Treatment Program (REACH-ETP) trial—resulting in about 12.8 percent of SMI patients having improved educational attainment. SMI includes psychosis, bipolar disorder, and major depression. SSDI is Social Security Disability Insurance. SSI is Supplemental Security Income.

EXHIBIT 4

Lifetime per person burden of serious mental illness (SMI) by age 25 in the status quo or under the improved education scenario, by source

	Status quo	**Improved education scenario**
Burden of SMI (1,000s of 2017 $)		
Incremental medical spending	96.5	97.7
Incremental SSDI costs	38.8	38.0
Incremental SSI costs	20.3	17.3
Lost earnings	537.1	496.2
Value of QALYs lost[a]	1,160.0	1,130.0
Total lifetime cost	1,852.8	1,779.2
Per person reduction in SMI burden		
Absolute	—[b]	73.6
Percent	—[b]	4.0

SOURCE Authors' analysis of data for 1999–2015 from the Panel Study of Income Dynamics, for 1998–2012 from the Health and Retirement Study, for 2001–03 and 2007–10 from the Medical Expenditure Panel Survey, and for 2007–10 from the Medicare Current Beneficiary Survey. **NOTES** The exhibit shows expected burden from age twenty-five until death, based on simulations from the Future Americans Model. The improved education scenario is explained in the notes to exhibit 3. SMI includes psychosis, bipolar disorder, and major depression. SSDI is Social Security Disability Insurance. SSI is Supplemental Security Income. [a]Based on a value of $100,000 per quality-adjusted life-year (QALY) lost. [b]Not applicable.

SMI, we found that it at least alleviated the burden. Simulating the potential benefits of an improved education scenario consistent with the measured effects of existing interventions, we found improved outcomes for people with SMI, including an average increase of 0.8 percent in quality-adjusted life-years and a 7.0 percent increase in lifetime earnings. At the cohort level, this was associated with a decrease in the average per person economic burden of $73,600 (4.0 percent).

Policy Implications

These findings highlight both the opportunities and the challenges in introducing new intervention strategies to improve outcomes for people with SMI. The opportunities are clear: Based on the numbers above, each new cohort of SMI patients experiences nearly a quarter of a trillion dollars in economic burden, and our hypothetical improvement in educational attainment would reduce that by over $8.9 billion. In addition, the intervention we based our policy simulation on is flexible and adaptable and was implemented across a variety of geographic settings (urban, suburban, and rural). However, these gains would be diffuse across different agents and spread across many years, which suggests that the economic case might not be realized without public investment or subsidy. Effectively implementing such an intervention on a wide scale would require substantially increasing the behavioral health system's capacity, including the hiring and training of additional providers.

Conclusion

The burden of early-onset SMI is large, but improved educational outcomes can greatly reduce that burden. Relatively low-cost interventions that focus on helping people with early-onset SMI enroll in school and obtain appropriate accommodations from teachers and administrators, as well as providing ongoing meetings between students with SMI and their teachers, can have large impacts on school participation. However, many assessments of these programs focus on outcomes that are not easily translated to existing nationally representative surveys to estimate their broad or long-term effects. Future interventions and evaluations should consider using clearly defined and objective outcome measures such as educational attainment that can be linked to publicly available data sources to help facilitate measuring their economic value. ■

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21 To access the appendix, click on the Details tab of the article online.

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