Promoting Readiness of Minors with Autism Spectrum Disorder:

Evidence from a Randomized Controlled Trial

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Executive Summary

Youth with disabilities—particularly those receiving Supplemental Security Income (SSI)—face barriers to achieving education and employment outcomes at the individual, family, and systemic level that can undermine the foundation for their longer-term success. The transition from adolescence to adulthood can be particularly challenging for youth with intellectual and development disabilities such as autism spectrum disorder (ASD). These disabilities can have lifelong effects on youth's cognition, emotional regulation, communication, and relationship skills that might make it difficult to pursue continued education, long-term employment, and independent living.

PROMISE—Promoting Readiness of Minors in SSI—was an initiative to address critical issues related to supporting youth with disabilities. It was a joint initiative of four U.S. federal agencies: the U.S. Department of Education, the Social Security Administration (SSA), the U.S. Department of Health and Human Services, and the U.S. Department of Labor. PROMISE focused on addressing issues related to youth with disabilities by funding and evaluating programs designed to facilitate a healthy transition to adulthood and set the stage for years of positive outcomes for youth. The initiative focused on youth ages 14 to 16 who were receiving SSI as well as their families. Six projects across 11 states implemented model demonstration projects that had to include the following components: (1) formal partnerships between state agencies (such as those providing services related to vocational rehabilitation, workforce development, and Medicaid), (2) case management, (3) benefits counseling and financial education for youth and their families, (4) career and work-based learning experiences for youth, and (5) parent training and information (U.S. Department of Education 2013a).

Under contract with SSA, Mathematica is conducting the national evaluation of the PROMISE initiative. The evaluation examines the way the projects were implemented, their impacts on youth and families, and how cost effective they were. The evaluation, based on a random assignment design, collected a wealth of information about the types of services youth with disabilities receive in the absence of PROMISE, how the PROMISE demonstration projects were implemented, and the impact of the PROMISE interventions. In this report, we use the information collected for the PROMISE evaluation to examine specifically the experiences and outcomes of youth with ASD receiving SSI who enrolled in PROMISE.

We begin by describing the characteristics of youth with ASD receiving SSI who enrolled in PROMISE and show that they differed significantly from other youth receiving SSI in the evaluation. We then present findings on the services available to youth with ASD and their families under the status quo, based on our analyses of youth and families in the control group. We find that many youth with ASD received transition services even without the PROMISE projects, but we also found room for improvement in the specific types of services targeted by PROMISE (such as case management, employment-promoting services, benefits counseling, and financial education) and in their families' receipt of support services. Our estimates of the impacts of PROMISE as of 18 months after youth enrolled in the program suggest that PROMISE had substantial impacts on the service receipt, job-related training, employment, and earnings of youth with ASD, but it had no impact on their education, total income, or use of SSA benefit programs. The impacts of PROMISE on the outcomes of youth with ASD were similar to those for youth with non-ASD impairments, except that youth with ASD experienced a smaller relative increase in their receipt of transition services because of PROMISE.

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I. Introduction

Autism spectrum disorder (ASD) is one of the most common developmental disabilities in the United States. Recent national estimates suggest that 1 in 54 children have been diagnosed with ASD and that its prevalence might be rising (Maenner et al. 2020). Although many young people with disabilities—particularly those receiving Supplemental Security Income (SSI)—face challenges in transitioning from adolescence to adulthood at the individual, family, and systemic level, this transition can be particularly challenging for youth with ASD. The characteristics of ASD are impairments in communication and social interaction, repetitive behaviors, and limited areas of interest (American Psychiatric Association 2013). These can have lifelong effects on youth's cognition, emotional regulation, communication, and relationship skills and make it difficult to pursue continued education, long-term employment, and independent living.

Recent estimates suggest that about 70,700 to 111,600 youth with ASD age into adulthood each year, and most are known to struggle with the transition (Shattuck 2019). After leaving high school, youth with ASD tend to experience decreasing behavioral improvement, increasing social isolation, and difficulties obtaining and maintaining postsecondary work and education (Shattuck et al. 2012; Taylor and DaWalt 2017; Taylor et al. 2015; Taylor and Seltzer 2011). Aspects of the transition to adulthood that youth with ASD struggle with include higher education, postsecondary employment, health care, social connectedness, and independent living (Shattuck et al. 2012; Simonsen and Neubert 2013; Roux et al. 2015). Their outcomes are also poor relative to peers with other disabilities. For example, across the ability spectrum, people with ASD have lower participation rates in vocational or technical education, employment, and postsecondary education in 2- or 4-year programs than their peers with speech and language impairments, learning disabilities, or intellectual disabilities for as long as seven years after high school (Shattuck et al. 2012). A large share of youth with ASD remain unemployed, underemployed, or in low-wage jobs throughout adulthood (Cimera and Cowan 2009; Cimera et al. 2012; Henninger and Taylor 2013; Schall et al. 2014; Shattuck et al. 2011, 2012b).

Although targeted and effective services can help youth with ASD transition to adulthood and long-term success, many do not receive such services. Recent surveys of parents and guardians of young adults with ASD ages 19 to 23 found that 39 percent of youth with ASD represented by the survey received no mental health services, medical evaluation and assessment, speech therapy, and case management in the two years before or after leaving high school (Shattuck et al. 2011). Among youth with ASD in a vocational rehabilitation (VR) program, although the odds of gaining employment were greater for youth who received job placement services, only 48 percent of youth received this service (Migliore et al. 2012). In addition, service receipt tends to drop off after high school (Shattuck et al. 2011).

In recent decades, there has been a marked increase in the reported prevalence of ASD among children in the U.S (Perou et al. 2013).[1] Relatedly, the number of children and adults with ASD receiving SSI benefits has climbed steeply (Boat and Wu 2015; Anderson et al. 2020a). Moreover, 9 in 10 adult SSI awardees with ASD are between 18-25 years old, a key stage in the transition to adulthood (Anderson et al. forthcoming). These trends point to a growing need to not only develop effective, scalable transition services for youth with ASD but also connect more youth to them. PROMISE—Promoting Readiness of Minors in SSI—was an initiative to address critical issues related to supporting youth with disabilities

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[1] It is not known to what extent the increase in reported prevalence is attributable to an increase in the occurrence of the condition rather than changes in diagnostic and reporting practices, greater public awareness, changes in referral patterns, and a decreasing age at diagnosis.

who are receiving SSI and their families. It was a joint initiative of four U.S. federal agencies: the U.S. Department of Education (ED), the Social Security Administration (SSA), the U.S. Department of Health and Human Services, and the U.S. Department of Labor. PROMISE focused on addressing issues related to supporting youth with disabilities by funding and evaluating projects designed to facilitate a healthy transition to adulthood and set the stage for years of positive outcomes for youth who were receiving SSI as well as their families. Across 11 states, six projects implemented model demonstrations that focused on youth ages 14 to 16 receiving SSI. The projects had to include (1) formal partnerships between state agencies (such as those providing services related to VR, workforce development, and Medicaid), (2) case management, (3) benefits counseling and financial education for youth and their families, (4) career and work-based learning experiences for youth, and (5) parent training and information (U.S. Department of Education 2013a). Compared with existing transition services available at the time, PROMISE was unique in its focus on cross-agency collaboration, comprehensive case management, focus on younger people, and services to family members that focus on improving their economic status as well as that of the youth.

Under contract with SSA, Mathematica is conducting the national evaluation of the PROMISE initiative. The evaluation examines the way the projects were implemented, their impacts on youth and families, and how cost effective they were. The evaluation, based on a random assignment design, collected a wealth of information about the types of services youth with disabilities receive in the absence of PROMISE, how the PROMISE projects were implemented, and the impact of the PROMISE interventions. In the national evaluation's first impact evaluation report, Mamun et al. (2019a) estimated the impacts of each of the six PROMISE projects on outcomes related to service receipt, education, employment, expectations, health insurance, income, and youth self-determination. They also estimated the impacts of the projects on participation in SSA and other public assistance programs for youth with disabilities (both ASD and non-ASD impairments) and their families about 18 months after enrollment.

This report focuses on the experiences and outcomes of youth with ASD who participated in the national PROMISE evaluation. Using information collected for the national evaluation, it addresses five research questions:

1. What are the characteristics of youth with ASD enrolled in PROMISE and how do they differ from those of other PROMISE youth?
2. To what extent did youth with ASD in the control group and their family members receive transition services, and how do the types of services differ from those received by youth with other impairments and their families under the status quo?
3. Did the PROMISE projects lead to the use of more transition and support services for treatment group youth with ASD and their families, compared with those of control group youth with ASD and their families?
4. Did the PROMISE projects improve the outcomes of treatment group youth with ASD, including their educational attainment, employment credentials, employment, and SSI payments, compared with those of the control group youth with ASD?
5. How did the impacts of PROMISE on these outcomes for youth with ASD compare with the impacts of PROMISE on these outcomes for youth with non-ASD impairments?

We organize the report as follows. In Section II, we provide background information describing some of the unique challenges faced by youth with ASD, existing research on effective interventions for this group, and the PROMISE demonstration. In Section III, we describe the approach we used to estimate impacts, including a description of the research design, data sources, study sample, outcome measures, and analytical methods. In Section IV, we present findings from our analyses of the impacts of PROMISE on service receipt and outcomes 18 months after enrollment for youth with ASD and whether these impacts differed significantly from those for youth with non-ASD impairments. The final section of the report summarizes our findings and their implications.

II. Background

A. Challenges faced by youth with ASD

The transition from adolescence to adulthood can be complex and fraught with risks and concerns that can lead to poor outcomes for many people (Hogan and Astone 1986). Youth with disabilities face individual, family, institutional and systemic barriers that can make this transition more difficult, including challenges related to their health, social isolation, service needs, lack of access to supports, and lack of continuity and coordination of care between child and adult systems (Osgood et al. 2010); GAO 2012). For youth receiving means-tested SSI and their families, the difficulty of this transition is often compounded by the added constraints of poverty. As a result, SSI-receiving youth with ASD can face unique challenges in the transition to adulthood, as described below.

First, the core features of the ASD diagnosis can make the transition to adulthood more difficult. These features include difficulties with social communication and interaction as well as restricted, repetitive patterns of behavior, interests, or activities. In addition, post-secondary education and employment outcomes for youth tend to worsen according to the severity of ASD symptoms (Shattuck et al. 2012; Wei et al. 2015). It is common for people with ASD to have a co-occurring intellectual disability marked by deficits in intellectual and adaptive functioning; a recent analysis estimated that about a third of children with ASD also have an intellectual disability (Maenner et al. 2020). Across studies, correlates of post-secondary employment for youth with ASD include the absence of an intellectual disability, fewer autism-related symptoms, greater functional independence, and fewer aspects of functioning limited by disability (Shattuck et al. 2012; Taylor and Seltzer 2011).

Second, people with ASD face disproportionately high rates of co-occurring medical and mental health conditions. For example, attention-deficit/hyperactivity disorder, which can make it challenging for youth to concentrate on school and work, affects an estimated 30 to 61 percent of children with ASD compared with just 6 to 7 percent of the general population (Goldstein and Schwebach 2004; Lee and Ousley 2006; Gadow et al. 2006; Perou et al. 2013; Romero et al. 2016). Children and adolescents with ASD also have high rates of epilepsy, sleep disorders, gastrointestinal disorders, metabolic disorders, hormone dysfunction, obesity, nutritional deficits, anxiety, depression, and oppositional defiant disorder (Bauman 2010; Bradley and Bolton 2006; de Bruin et al. 2007; Joshi et al. 2010; McCarthy et al. 2010; Levy et al. 2010; Simonoff et al. 2008; Autism Speaks 2017; Croen et al. 2019). The presence of these co-occurring conditions presents additional health and other challenges, and is associated with poorer transition outcomes. For example, among youth with ASD engaged in federal rehabilitation services, the presence of a secondary disability is associated with lower odds of successful competitive employment (Schaller and Yang 2005).

Third, youth with ASD often require various kinds of support from multiple service providers and across different sectors and systems of care, and they could face increasing difficulty meeting their complex service needs as they transition to adulthood and learn to navigate adult service systems (Foster and Gifford 2005; Shattuck et al. 2011). For example, the Individuals with Disabilities Education Act requires schools to provide special educational and related services, including transition services, and may include speech, behavioral, and occupational therapy, for students with ASD as needed. The mandate for this provision ends, however, after students graduate from high school with a regular high school diploma or when they turn age 22, which means they are no longer subject to the Individuals with Disabilities Education Act requirements. As a result, the exit from high school has been likened to falling off a cliff for people with ASD because of the drastic reduction of supports and services that occur at this time (Levy and Perry 2011; Roux et al. 2015).[2] As another example, the transition to legal adult age might mean that youth no longer qualify for health insurance through the Children's Health Insurance Program or their parent's private health insurance, so they or their guardian must find them new health insurance coverage (such as through applying for Medicaid) and start over in the difficult task of coordinating their clinical care and health needs.

Fourth, youth with ASD might have difficulty getting the most out of the services they can access. Difficulty with communication, which is a core characteristic of the ASD diagnosis, may present challenges in accessing and interacting with service providers. In addition, there is a lack of availability of and consistency in ASD-specific training across a range of providers and provider types, especially outside the realm of healthcare (U.S. Department of Health and Human Services 2017). These factors may complicate the targeting, delivery and quality of services provided to youth with ASD.

Fifth, poverty can compound these difficulties for many youth with ASD. Compared to youth with other special health care needs, those with ASD are more likely to live in low-income households (Anderson et al. 2020) – and notably, the PROMISE demonstration includes only low-income families since it targets youth who are receiving SSI, a means-tested benefit. Youth with ASD who are living in poverty often face additional challenges in their transition to adulthood. For example, youth with ASD from poorer households tend to have fewer choices for services, more unmet healthcare needs, fewer opportunities for work experiences, and less access to timely transition planning, than those from high-income households (Roux et al. 2015; Shattuck et al. 2018). Compared to youth with ASD from high-income households, low-income youth with ASD are likely to have poorer health, higher autism severity, and have serious difficulty concentrating, remembering, or making decisions because of a physical, mental, or emotional condition (Shattuck et al. 2018; Anderson et al. 2020b)—and they are less likely to receive healthcare transition services as they age into adulthood (Rast et al. 2015). Perhaps as a result of these challenges, low-income youth with ASD face worse outcomes in terms of education, employment, independent living and social isolation in their early 20s, compared to their peers from high-income households (Roux et al. 2015).

B. Prior research on promising interventions for youth with ASD

There is limited information on evidence-based practices specific to improving the employment outcomes of youth and young adults with ASD. Providing transition-age youth with disabilities work experience during adolescence is a core component of prominent transition frameworks (National Alliance for Secondary Education and Transition 2005; National Collaborative on Workforce and Disability for Youth 2009). A prior review of the literature on youth with ASDs identified more than 4,000 studies of interventions and their effects on post-high school outcomes (Taylor et al. 2012). The authors identified only six evaluations of vocational interventions, however, all of which were judged to be of poor quality, highlighting the urgent need to develop the evidence base for interventions that can promote employment among young people with ASD (Taylor et al. 2012). Moreover, none of these evaluations focused on low-income youth with ASD such as those receiving SSI—who are at greater risk for poor employment

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[2] In addition to losing in-kind supports, SSI-receiving youth undergo a mandatory redetermination of eligibility at age 18. SSA historically finds that about 1/3 of youth are no longer eligible for SSI as a result of these reviews, ending cash benefits and a categorical eligibility for Medicaid in most states (Hemmeter and Bailey 2015). Youth with ASD and other pervasive development disorders are relatively unlikely to be ceased at age 18. (Hemmeter 2012)

outcomes—so it is not known if these findings translate to the target population of PROMISE. Importantly, there has not been extensive research on interventions that target youth with ASD from low-income households, who are at greater risk for poor employment outcomes (Roux et al. 2015).

To date, only one model of a transition-to-work program is supported by strong evidence that suggests it is effective for improving employment outcomes of youth with ASD. Project SEARCH (PS) is an intensive transition program designed to engage youth with intellectual and developmental disabilities ages 18 to 22 in paid work experiences (Rutkowski et al. 2006). It helps youth build work skills through a series of individualized unpaid internships in applied business settings using supported employment, including key features such as complete immersion in a workplace, personalized curriculums, customized internships, highly trained staff, and collaboration among service provider agencies. Students rotate through three 10- to 12-week unpaid internships in the business over one school year, learning competitive, marketable, and transferrable skills (Schall 2013). Because it is a collaborative model, PS requires the involvement of multiple community partners, including host businesses, state VR programs, and local educational agencies. An adaptation of this model, known as PS + ASD Supports, includes diagnosis-specific supports that address the vocational, learning, social, and communication needs of people with ASD (Wehman et al. 2013).

Four small-scale experimental studies suggest that PS + ASD Supports can result in rates of competitive, integrated employment ranging from 73 percent to 90 percent for participants with ASD and intellectual and developmental disabilities, compared with 6 to 17 percent employment for control groups (Wehman et al. 2014; Wehman et al. 2017; Wehman et al. 2020; Whittenburg et al. 2020). For example, Wehman et al. (2017) and found that at three months after graduation, 90 percent of the youth receiving PS + ASD Supports acquired competitive, part-time employment earning \$9.53 to \$10.66 per hour and that 87 percent maintained employment at 12 months after graduation. In contrast, only 6 percent of the control group had employment by 3 months after graduation and 12 percent had employment by 12 months after graduation. Wehman et al. (2020) credit the success of the PS + ASD Supports model to the high dosage and intensity of the work experiences, use of evidence-based teaching strategies that are known to be effective for people with ASD, vocational assessments, opportunities for resume-building, and focus on collaboration with adult agencies.[3] Notably, although these studies used rigorous experimental designs, they had small samples, ranging from 14 to 156 youth. There has not been a rigorous impact evaluation of PS + ASD Supports to date that is based on a large sample. Further, the model's screening process and eligibility criteria result in the intervention serving high-functioning youth, which limits the generalizability of the findings to a broader population of youth with intellectual disability or ASD.

Some evidence suggests that supported employment interventions can improve the employment outcomes of adults with ASD (Wehman et al. 2012; Howlin et al. 2005; Lynas 2014; McLaren et al. 2017). Supported employment interventions focus on helping youth find a job and then adding needed supports to build skills and promote independence. Supported employment typically involves four phases: assessment (developing a job seeker profile), supported job search, on-the-job training, and long-term supports. Each phase takes the needs of youth with ASD into account (Schall et al. 2015; Brooke et al. 2018). For example, Wehman et al. (2012) studied the use of supported employment for adults with ASD who were consecutively referred for competitive employment services by VR counselors. Of the 33 participants, 27 were assisted into competitive, integrated employment, and they all earned wages and

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[3] Project SEARCH is a 9-month program where youth rotate through three 10-12 week internships within a business, logging approximately 720 hours of internship time learning marketable skills and 180 hours of classroom time for a total of approximately 900 embedded hours (Wehman et al. 2014).

benefits commensurate with coworkers performing the same or similar tasks. All four studies were limited, however, by small samples and non-experimental designs; they do not provide strong evidence of the extent to which supported employment led to improvements in outcomes relative to business-as-usual.

Technology might have the potential to help youth with ASD attain employment and independence. Smith et al. (2015) conducted a small-scale experimental study and found that when 23 youth and young adults with ASD used a virtual reality job interview training program to practice interviewing, they were more likely than control participants to have secured a competitive employment or volunteering position within the community six months later. Notably, results for employment alone were not available. In addition, in a recent randomized controlled trial of 50 adults with ASD, those who were taught to use a personal digital assistant to organize employment tasks and meet job support needs (such as using tasks lists, picture prompts, task reminders, navigation tools, and task-sequencing prompts) required significantly fewer hours of job coaching support compared with a control group of participants (Gentry et al. 2015). Notably, both studies were completed with people with greater cognitive abilities.

Before PROMISE, there was only one large-scale evaluation of a transition program for youth receiving SSA disability benefits: the Youth Transition Demonstration evaluation. The purpose of the evaluation was to identify and test promising service strategies, combined with SSA waivers of certain program rules to enhance work incentives, in order to help youth with disabilities ages 14 to 25 maximize their economic self-sufficiency as they transition to adulthood. The findings from that evaluation suggest that interventions that provide substantial doses of well-designed services, including employment services, to youth with disabilities can improve key transition outcomes in the short-to-medium term and can significantly improve short-term employment outcomes (Fraker et al. 2014a; Hemmeter 2014). To date, PROMISE is the only other large-scale national evaluation of an intervention designed to improve the long-term outcomes of transition-age youth with disabilities.

C. The PROMISE demonstration

PROMISE was a joint initiative to support youth with disabilities ages 14 to 16 who were receiving SSI (as well as their families) in making a healthy transition to adulthood. The PROMISE Evaluation Design Report thoroughly describes the demonstration (Fraker et al. 2014b). Here, we highlight the most salient features necessary to understand the context of this study focused on youth with ASD.

Before PROMISE, youth with disabilities, their families, service providers, and practitioners faced a complex and fragmented transition service system that struggled to meet the needs of youth and their families because of lack of coordination and comprehensiveness (Livermore et al. 2020). The federal partners that sponsored the PROMISE initiative designed it to address these challenges through two main features: strong partnerships between the agencies that provide services to youth receiving SSI and their families and an individual- and family-centered approach to case management and service delivery. The federal partners also identified a set of services that could achieve the desired results and required the PROMISE projects to include the following core components (U.S. Department of Education 2013a):

- **Formal partnerships between state agencies** that provide VR services, special education and related services, workforce development services, Medicaid services, income assistance from Temporary Assistance for Needy Families, and services provided by federally funded developmental disability and mental health services programs

- **Case management** to ensure adequate planning and coordination of PROMISE services, help for youth and their family members with navigating the broader service delivery system and with transition planning for goals and services after high school
- **Benefits counseling and financial education** for youth and their families on SSA work incentives, eligibility requirements of various programs, rules governing earnings and assets, and topics promoting families' financial stability
- **Career and work-based learning experiences,** including paid and unpaid work experiences in an integrated setting while they were in high school
- **Parent training and information** in two areas: (1) the parents' or guardians' role in supporting and advocating for their youth to help them achieve their education and employment goals and (2) resources for improving the education and employment outcomes of the parents or guardians and the economic self-sufficiency of the family

Compared with other similar initiatives at the time, PROMISE was unique in its focus on cross-agency collaboration, comprehensive case management, focus on younger people, and services to family members that aim to improve their economic status as well as that of the youth. For the PROMISE initiative, the U.S. Department of Education awarded $230 million over six years to five states and a consortium of six states to establish and operate model demonstration projects (U.S. Department of Education 2013b). Thus, PROMISE represented a relatively large investment on top of the federal expenditures that already support youth with disabilities.[4]

Table 1 lists the six PROMISE projects along with information about their locations, enrollment periods, service delivery end dates, and number of youth included in the research sample for the evaluation. Our research sample comprises all youth who were randomly assigned (that is, all research cases).[5] All programs delivered PROMISE services through September 2018, and some delivered services longer.

18-month impacts of the PROMISE projects

Mathematica examined the impacts of each PROMISE project on youth receiving SSI and their families during the 18 months after study enrollment (Mamun et al. 2019a). Projects' impacts on youth and their families were in line with the core components of services required under the PROMISE initiative. Each of the programs increased youth's receipt of transition services, youth's paid employment, and family members' receipt of support services during the first 18 months after enrollment. None of the programs increased the share of youth who were enrolled in school, which was already high. Four programs (Arkansas PROMISE, CaPROMISE, MD PROMISE, and WI PROMISE) had positive impacts on youth's total income from earnings and SSA payments.

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[4] Mamun et al. (2019a) estimated the economic cost to implement each PROMISE project, including the costs of service delivery and program administration and costs not directly incurred by the program, such as volunteer labor and donated facilities or supplies. Across the six PROMISE projects, the average annual cost per treatment group enrollee ranged from $5,490 to $9,148. For context, in 2014, the federal government spent an estimated $5,000 per youth with disability on public programs and supports specific to them or that represented assistance programs used by many such youth (Shenk and Livermore 2019).

[5] Some youth were not randomly assigned. For example, if siblings were eligible for the study, the first youth would be randomly assigned to the treatment or control group and the second youth was placed in the same group as the first. A small number of youth withdrew or died during the 18-month period and they were included in the research sample since they were randomly assigned.

Mathematica is conducting the national evaluation of how the projects were implemented and operated, their impacts on SSI payments and the education and employment outcomes for the youth and their families, and how cost effective they were. The evaluation relies on an experimental design, in which eligible youth who applied to the projects were randomly assigned to either a treatment group with an opportunity to receive PROMISE services or to a control group with access to the usual services available in the community, that is, the status quo. As part of the evaluation, Mathematica collected substantial information about how the PROMISE projects were implemented as well as individual-level survey and administrative data on the youth and parents participating in the experimental study. Mathematica examined the outcomes of youth and families during the 18 months after study enrollment and found positive short-term impacts on youth's receipt of transition services, their employment, and their families' receipt of support services that were generally similar across the six PROMISE projects (see text box). The national evaluation's planned five-year surveys and impact analysis will provide information about the extent to which the PROMISE projects meaningfully improved the well-being of youth and their families in the longer term.

Table 1. The six PROMISE projects

PROMISE project	Area covered	Enrollment period	Service end date	Number of youth in research sample
Arkansas PROMISE	25 of the state's 75 counties	September 2014 to April 2016	June 2019	1,805
ASPIRE	Statewide in six states: Arizona, Colorado, Montana, North Dakota, South Dakota, and Utah	October 2014 to April 2016	May 2019	1,953
California PROMISE	18 local sites covering 20 local educational agencies	August 2014 to April 2016	June 2019	3,097
Maryland PROMISE	Statewide	April 2014 to February 2016	September 2018	1,866
New York State PROMISE	Capital Region, Western New York, and New York City	October 2014 to April 2016	August 2019	1,967
Wisconsin PROMISE	Statewide	April 2014 to April 2016	September 2018	1,896

Source: Livermore et al. (2020).

ASPIRE = Achieving Success by Promoting Readiness for Education and Employment; PROMISE = Promoting Readiness of Minors in SSI; SSI = Supplemental Security Income.

III. Study design

In this section, we describe our research design, data sources, study sample, outcome measures, and analysis methods. This study draws on the design of the PROMISE 18-month impact study (Mamun et al. 2019a). Throughout the discussion of the study design that follows, we borrow heavily from the thorough description of the methods and data provided in the technical appendix to the PROMISE 18-month impact study (Mamun et al. 2019b). Here, we summarize the features of the study design most relevant to the current analysis.

A. Experimental design

The national PROMISE evaluation is based on a random assignment design (described in detail in Fraker et al. 2014b). Each of the six PROMISE projects enrolled eligible youth separately, and Mathematica randomly assigned youth separately for each project. Mathematica randomly assigned PROMISE-eligible youth who agreed to enroll in the evaluation to either a treatment group, which meant that they were eligible to receive PROMISE services, or to a control group, which meant that they were not eligible for PROMISE services but could receive other services available in their communities. This experimental design enabled us to assess the extent to which the PROMISE projects affected participation in youth transition and family support services and to account for similar services that might have been available to the control group from other sources.

Random assignment should create two groups of youth with similar pre-intervention experiences and characteristics, on average, so that any difference in the outcomes of the two groups can be attributed to the PROMISE projects. Even though we did not stratify random assignment by impairment type, we expect that youth with ASD who we randomly assigned to the treatment group versus the control group were similar, on average (see Appendix Table A1). As a result, we can attribute any observed differences in outcomes between youth with ASD in the treatment and control groups to be an accurate estimate of the impacts of PROMISE on youth with ASD. The current analysis reports on whether PROMISE improved the 18-month outcomes of the youth with ASD who were offered PROMISE services.

B. Data

We used data from the PROMISE random assignment system, parent and youth 18-month surveys, SSA program records, and state VR agencies for the current study. Here, we provide a brief description of these data sources, drawing on the detailed information in the technical appendix to the PROMISE Interim Services and Impact Report (Mamun et al. 2019b).

1. Random assignment system data

Mathematica designed and maintained a web-based system for random assignment to enroll youth in PROMISE. At the time of enrollment in the evaluation, project staff at each PROMISE project entered data about the youth and the enrolling parent (such as name, date of birth, Social Security number [SSN], sex for the youth and the enrolling parent, and the parent's relationship to the youth) into the system. Data from this system are available for each PROMISE project, all randomly assigned youth, and the parent who enrolled them. Our study of ASD youth used data from the random assignment system, including the youth and parent data entered by project staff, the project's name, the project's region, the youth's random assignment group, the date that assignment occurred, and an indicator of whether the youth was a research case (that is, randomly assigned).

2. Parent and youth 18-month surveys

Mathematica conducted separate follow-up surveys of the youth and their parents about 18 months after they enrolled in the evaluation and were randomly assigned.[6] The surveys were typically administered by telephone, although field staff used computer-assisted in-person interviews for sample cases that were difficult to contact by phone or required an in-person interview because of a disabling condition. The PROMISE 18-month parent and youth survey response rates were high (about 74 percent for youth with ASD), and the response rates for treatment and control group sample members did not differ.

The survey collected information that we could not readily obtain from administrative records or other sources, and it focused on outcomes that the projects might have affected in the 18-month time frame. Specifically, in the parent survey, we asked questions about services received by the youth and their family members during the 18-month follow-up period, employment experience and credentials obtained by the parents, parent's individual and family well-being (covering health, health insurance, income, and program participation), parent expectations for the youth, and the parent's demographic information. In the youth survey, we asked questions about youth's receipt of services, education, training, employment and work-based experiences, self-determination, expectations, and demographic information.

In five of the six PROMISE projects, all people who enrolled in the evaluation and were randomly assigned were eligible to be interviewed for the 18-month survey. California PROMISE was the only exception, in which we sampled 2,000 of the 3,097 randomly assigned enrollees for the survey. Evaluation enrollees who were deceased or withdrawn from the evaluation during the 18-month period were not targeted for the survey. We used a stratified random sampling approach, using local educational agencies and treatment status to define the strata, so that the relative distribution of sampled cases mirrored that of all study enrollees within each stratum (CyBulski et al. 2014). Because we only sampled a subset of all youth and families enrolled in the evaluation in California, we used sampling weights when analyzing outcomes based on survey data.

3. SSA program records

We used SSA program data on to examine the youth's and parents' characteristics and SSA disability payments through SSA program records. We used the disability program benefit data from April 2013 to October 2017, which covered the 12 months before random assignment through the 18 months after enrollment for all youth enrollees and their parents. Data on SSI receipt, including dates of application and monthly payment amounts, came from the Supplemental Security Record (SSR), which contains records for every person who has ever applied for SSI benefits since 1974 and includes information required for the processing of claims and ongoing determination of program eligibility). Data on Old-Age, Survivors, and Disability Insurance (OASDI) program payments came from the Payment History Update System for all months through 2016 and from the Master Beneficiary Record for all months in 2017.

We obtained data on several key baseline characteristics from the Supplemental Security Record, including length of SSI payment receipt at random assignment, age at first SSI application, and the primary impairment that was the basis for the youth's SSI eligibility. We used this information to assess whether random assignment created two equivalent groups in each program and to construct covariates for use in multivariate regression models for estimating PROMISE impacts (see Section F below). We

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[6] Although the target respondents for the youth survey were the youth themselves, they were sometimes helped by their parents, or proxies supplied their responses. The target respondent for the parent survey was the parent or guardian who was "most knowledgeable about the services received by the enrolled youth."

identified youth with ASD based on whether their primary impairment recorded in the SSR was "Autistic disorders" at the end of the PROMISE enrollment period.

Because of the eligibility criteria associated with enrolling in PROMISE, all youth had to provide a valid SSN to enroll. Therefore, SSA had information on all youth in the research sample. Using information in the Supplemental Security Record, SSA identified a youth's parents (if available) as of the month of PROMISE enrollment. If the enrolling parent was either the youth's mother or father, the analysis sample included any parents identified in the record. If the enrolling parent was not a mother or father or there were no parents identified in the record, the analysis sample included the enrolling parent only if he or she provided a valid SSN.

4. State VR agency data

Each state involved in PROMISE provided Mathematica with data on youth and enrolling parents' participation in state VR services from January 2014 to December 2017. We could only obtain state VR services on individuals if we had a valid SSN for them. Therefore, we obtained VR data for all youth who enrolled in the evaluation and for enrolling parents who provided a valid SSN that we could verify.[7] Each extract contained information on the date of application, services received, and case closure status.[8]

C. Study sample

The PROMISE projects enrolled 12,584 youth in the evaluation, of which 1,588 had a diagnosis of ASD.[9] Because of survey nonresponse, our primary study sample includes 1,172 youth with ASD who were randomly assigned and who responded to the 18-month survey. Analyses of outcomes derived from administrative data, however, are based on larger samples.

We examined the characteristics of youth with ASD in the study sample (Table 2)[10]. Most youth with ASD were male, which is consistent with the finding that boys are four times more likely to be diagnosed with ASD than girls (Loomes et al. 2017). At the time of random assignment, 42 percent of youth with ASD were age 14, 27 percent were age 15, and 31 percent were age 16.

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[7] The enrolling parent was the parent who completed the PROMISE enrollment forms and provided consent to participate in the evaluation. For VR data, the analysis sample excluded those enrolling parents who did not have a valid SSN and therefore could not be accurately matched to the state data. This included enrolling parents who did not provide an SSN and instances in which the state agency had an SSN but SSA could not verify that the SSN was correct. Without a valid SSN, we could not determine whether the lack of data was because the SSN was incorrect or because the individual did not participate in Medicaid or VR.

[8] These data were from the states' general VR agencies. Three states involved in PROMISE—Arkansas, New York, and South Dakota—have a state VR agency for people who are blind, but we did not obtain data from those agencies.

[9] We identified youth with ASD based on the diagnosis code associated with the primary impairment recorded in SSA administrative records at the end of the PROMISE enrollment period. In a few cases, the primary impairment diagnosis code changed between the time of random assignment and the end of the PROMISE enrollment period based on medical eligibility redeterminations or continuing disability reviews.

[10] Since we identify youth with ASD based on the primary impairment recorded in the youth's SSA administrative records, we may undercount youth with ASD. Some youth with non-ASD impairments may have ASD as a secondary impairment.

Table 2. Baseline characteristics of youth with ASD and non-ASD impairments who were randomly assigned to the PROMISE group (percentage unless otherwise noted)

	Youth with ASD (A)	Youth with non-ASD impairment (B)	Difference (A - B)	*p*-value
Demographic characteristics				
Youth's sex is female	16.1	35.0	-18.8	0.00***
Youth's age at random assignment:				0.01***
14	42.3	35.1	7.2	
15	26.6	29.7	-3.1	
16	31.2	35.2	-4.0	
Average age	15.3	15.5	-0.1	0.00***
Youth's language preference at SSI application				
English is preferred written language	79.9	86.7	-6.9	0.00***
English is preferred spoken language	80.2	86.6	-6.3	0.00***
Youth's living arrangement at SSI application				0.80
In parents' household	83.5	83.3	0.2	
Own household or alone	14.0	14.7	-0.6	
Another household and receiving support	2.5	2.1	0.4	
Youth's race and ethnicity (from the 18-month survey)				0.00***
Non-Hispanic White	31.2	18.0	13.2	
Non-Hispanic Black	20.5	37.0	-16.6	
Hispanic	36.8	31.9	4.9	
Non-Hispanic American Indian	1.0	2.2	-1.3	
Non-Hispanic other or mixed race	7.7	8.3	-0.6	
Missing	2.9	2.5	0.4	
Enrolling parent's age (from the random assignment system)	44.7	43.2	1.5	0.00***
Parent's race and ethnicity (from the 18-month survey)				0.00***
Non-Hispanic White	34.2	23.1	11.2	
Non-Hispanic Black	21.2	38.4	-17.2	
Hispanic	35.4	28.2	7.2	
Non-Hispanic American Indian	1.1	1.8	-0.6	
Non-Hispanic other or mixed race	6.9	6.2	0.7	
Missing	1.1	2.4	-1.2	
Disability				
Youth's primary impairment[a]				0.00***
Intellectual or developmental disability	99.2	37.5	61.6	
Speech, hearing, or visual impairment		2.1		
Physical disability		15.8		
Other mental impairment [b]	0.3	39.0	-38.7	
Other or unknown disability	0.5	5.6	-5.1	

	Youth with ASD (A)	Youth with non-ASD impairment (B)	Difference (A - B)	*p*-value
SSA program participation				
Youth's SSA payment status at random assignment				
Received SSI	94.5	93.8	0.7	0.54
Received OASDI	8.3	11.2	-2.9	0.02**
Years since youth's earliest SSI eligibility at random assignment	9.1	8.8	0.3	0.15
Youth's age at most recent SSI application	7.1	7.1	0.0	0.88
Youth's payments in year before random assignment ($)				
SSI	7,038	7,329	-291	0.00***
OASDI	260	318	-58	0.24
Total SSI and OASDI	7,297	7,647	-349	0.00***
Household has multiple SSI-eligible children	16.7	19.5	-2.8	0.10*
Number of youth	569	4,157		

Source: SSA administrative data unless otherwise noted.

Notes: The sample includes all youth who completed the PROMISE 18-month youth survey. We identified youth with ASD based on whether their primary impairment recorded in SSA administrative records was "Autistic disorders" at the end of the PROMISE enrollment period. We weighted statistics to adjust for survey nonresponse. Youth living arrangements recorded as "living in own household or alone" in the SSA data include living in a residential facility, foster care, another relative's household but paying a fair share of expenses, and in one's own household. The *p*-value for a continuous or binary variable is based on a two-tailed *t*-test. The *p*-value for a multinomial categorical variable, which we present in the row for the first category, is based on a chi-square test across all categories.

[a] Primary impairment is based on the primary impairment recorded in the youth's SSA administrative records at the time of random assignment. In a few cases, the primary impairment changed between the time of random assignment and the end of the PROMISE enrollment period because of redeterminations or continuing disability reviews.

[b] Other mental impairments include conditions such as chronic brain syndrome; schizophrenia; borderline intellectual functioning; and affective, anxiety, personality, substance addiction, somatoform, eating, conduct, oppositional/defiant, and attention-deficit/hyperactivity disorders.

*/**/*** The difference is significantly different from zero at the .10/.05/.01 level.

ASD = autism spectrum disorder; OASDI = Old-Age, Survivors, and Disability Insurance; PROMISE = Promoting Readiness of Minors in SSI; SSA = Social Security Administration; SSI = Supplemental Security Income.

About four in every five youth with ASD expressed a preference for English as their written and spoken language. Most (84 percent) lived with their parents, but 14 percent lived in their own households or alone at the time they applied for SSI.[11] The largest racial and ethnic group was Hispanic (37 percent), followed by non-Hispanic White (31 percent), non-Hispanic Black (21 percent), non-Hispanic other or mixed race (8 percent), and Non-Hispanic American Indian (1 percent). The racial and ethnic composition of youth with ASD roughly mirrored that of their parents, as expected.

About 95 percent of youth with ASD in the sample received SSI payments during the month of random assignment. On average, nine years had passed since the time of their initial SSI eligibility, and they were

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[11] In the SSA data, youth who are considered living in their own household or alone include youth living in a residential facility, foster care, another relative's household but paying a fair share of expenses, and one's own household.

age 7 at the time of most recent SSI application, on average. About 8 percent of youth received OASDI payments in the month of random assignment, and youth received an average of $7,297 in SSA payments during the 12 months before the month of random assignment. About 16 percent of youth lived in a household with multiple SSI-eligible children.

There were several significant differences between youth with ASD and non-ASD impairments (Table 2). Compared with youth with ASD, a considerably larger share of youth with non-ASD impairments were female (more than a third). Youth with non-ASD impairments were slightly older, on average, than youth with ASD. A larger share of youth with non-ASD impairments than youth with ASD expressed a preference for English as their written and spoken language. The racial and ethnic composition of youth also differed based on impairment type, which may in part reflect racial disparities in ASD diagnoses (Mandell et al. 2009, Becerra et al. 2014). Among youth with non-ASD impairments, the largest racial and ethnic group was non-Hispanic Black (37 percent), followed by Hispanic (32 percent), non-Hispanic White (18 percent), non-Hispanic other or mixed race (8 percent), and Non-Hispanic American Indian (2 percent).

Naturally, youth differed in their primary impairments depending on whether they had ASD or non-ASD impairments. Among youth with non-ASD impairments, it was most common for youth to fall under the category of intellectual or developmental disability (38 percent), followed by other mental impairment (39 percent), physical disability (16 percent) and speech, hearing, or visual impairment (2 percent). As expected, nearly all youth with ASD impairments fell under the category of intellectual or developmental disability.[12]

A similar share of youth with ASD and with non-ASD impairments received SSI payments during the month of random assignment, but a larger share of youth with non-ASD impairments received OASDI payments (11 percent versus 8 percent). Youth with non-ASD impairments received more in SSA disability payments than youth with ASD during the 12 months before the month of random assignment ($7,647 versus $7,297). In addition, a larger share of youth with non-ASD impairments (about 20 percent) lived in a household with multiple SSI-eligible children.

D. Outcomes

We focused on assessing whether PROMISE improved outcomes for youth with ASD in five domains: (1) youth's receipt of transition services, (2) families' receipt of support services, (3) youth's education and training, (4) youth's employment and earnings, and (5) youth's economic well-being. We examined a subset of the outcomes analyzed in the national evaluation's 18-month impact analysis (Mamun et al. 2019a). We also followed the national evaluation in organizing outcomes as either primary or supplemental within each domain (see text box). Estimated impacts on the primary outcomes are the basis for evaluating the effectiveness of PROMISE, and estimated impacts on supplemental outcomes only serve to support the primary impact findings and draw broader conclusions in some instances. Here, we summarize the outcome domains of interest, identify the primary outcomes, and describe the

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[12] Primary impairment is based on the primary disability diagnosis code in the youth's SSA administrative records at the time of random assignment, and we identified youth with ASD based on their primary impairment code at the end of the PROMISE enrollment period. In a few cases, the primary disability diagnosis code changed between the time of random assignment and the end of the PROMISE enrollment period because of redeterminations or continuing disability reviews. In one study, about a quarter of youth with a primary impairment of ASD going into an age-18 redetermination were reassessed to have their primary impairment be listed as an intellectual disability (Hemmeter 2012).

supplemental outcome measures in each domain that we analyzed for this study. In doing so, we draw on the technical appendix to the PROMISE Interim Services and Impact Report (Mamun et al. 2019b).

Youth's receipt of transition services. A central goal of PROMISE was to connect youth with services that could help them more successfully transition to adulthood. Our primary outcome for assessing whether PROMISE increased the youth's connections to services is *whether youth received any transition services since random assignment*.[13] This measure is based on data from the parent survey. We also examined supplemental measures: types of services received, receipt of key services, whether youth applied for VR services, and whether they received VR services. Most measures are based on data from the 18-month parent and youth surveys; the two measures of VR service use are based on state VR agency data.

Selection of outcome measures for the 18-month impact study

The national evaluation team selected outcomes for the 18-month impact analysis before beginning the analysis of any data based on data availability, relevance to the program goals and target population, and whether the PROMISE logic model suggested that services were likely to affect the outcomes at the 18-month follow-up (Mamun et al. 2019a). Within each domain, the team identified one primary outcome measure and supplementary outcome measures. The estimated impacts on the primary outcomes became the basis for evaluating the PROMISE programs' effectiveness. The evaluation team purposely limited the number of primary outcome measures to avoid the statistical problem of multiple comparisons (Schochet 2009), which can arise when researchers estimate impacts on a large number of outcomes. At least a few of the estimates are likely to be statistically significant by chance, even if no true impacts occurred.

Family's receipt of support services. Another central goal of PROMISE was to connect families to services that could improve their economic well-being. Our primary outcome for assessing whether PROMISE increased families' connections to services is *whether families received any support services since random assignment*.[14] We based this measure on data from the parent survey. We also examined supplemental measures of the families' service receipt since random assignment: types of services received, receipt of key services, whether the parent applied for VR services, and whether the parent received VR services. We based most measures on data from the 18-month parent and youth surveys, but we based the two measures of VR service use on state VR agency data.

Youth's education and training. Prior studies suggest that transition services can improve education outcomes for youth with disabilities (NYS Education Department 1999; Fraker et al. 2012). Our primary outcome for testing whether PROMISE had an impact on the education of participating youth is *whether youth were enrolled in any type of school or college at the time of the 18-month survey*. We also

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[13] We used a single summary measure that indicates whether the youth received any services in the form of case management; school transition planning; employment-promoting services; benefits counseling; financial education; self-advocacy or self-determination training; life skills training; help obtaining or using assistive technology; help accessing education or training; and any other services to help prepare the youth for work, school, or living independently during the 18 months since PROMISE enrollment.

[14] We used a composite measure that indicates whether the family received services such as case management services, employment-promoting services, help with education, benefits counseling, financial education, parent training and information on disability or services or supports, parent networking, and other support services.

examined whether they received any training (that is, whether they had attended a training program or taken classes outside of school to help them learn job skills or get a job) or received any training credential since enrollment. We based these measures on data from the youth survey.

Youth's employment and earnings. One of the long-term objectives of PROMISE was to put youth on a path toward consistent long-term paid employment. To facilitate this, the model emphasized helping youth gain employment experiences. The primary outcome in this domain is *whether youth were ever employed in a paid job in the 18 months after random assignment*. The measure includes self-employment as a type of paid job, and we based it on data from the 18-month youth survey. We also examined impacts on employment, hours, and earnings in the past year. We based these measures on data from the youth survey.

Youth's economic well-being. A key long-term objective of PROMISE is to improve the economic well-being of youth by increasing their earnings from employment and reducing their dependence on public assistance programs. The primary outcome in this domain is *youth's total income from employment and SSA payments,* which is the sum of youth's self-reported earnings from employment in the year before the youth survey and youth's total SSI and OASDI payments over the same period. We based this measure on data from the youth survey and SSA administrative data. We also examined supplemental measures based on SSA program data: SSA benefit status and amount and type of benefits since random assignment.

F. Analysis methods

We used a multivariate regression framework to estimate the impacts of PROMISE on the outcomes of youth with ASD. Here, we briefly describe these methods, drawing on the detailed information contained in the technical appendix to the PROMISE Interim Services and Impact Report (Mamun et al. 2019b).

1. Estimating impacts

Proper random assignment should result in two groups of youth who are, on average, similar in their characteristics at the time they enrolled in the PROMISE evaluation. By design, a simple comparison of mean values of outcomes between the treatment group youth and control group youth would provide an unbiased estimate of project impacts. But because we had not stratified our random assignment by impairment type—and because youth with ASD are a small share of all enrolled youth—it is possible that, by chance, baseline characteristics among youth with ASD in the treatment group and the control group might differ. To address such concerns, we checked the baseline characteristics of treatment group youth with ASD and control group youth with ASD and confirmed they did not largely or significantly differ (Appendix Table A.1). This suggests that random assignment was well executed and assures us that a comparison of the outcomes of youth with ASD in the treatment group and control group would provide an unbiased estimate of the impacts, on average.

To improve the statistical precision of our impact estimates, we computed regression-adjusted impact estimates by using multivariate regression models. All regression models included a core set of covariates: youth's race and ethnicity (categories; non-Hispanic white is the omitted category); whether youth is female; youth's duration of SSI payments at random assignment; whether youth's household has multiple SSI-eligible children; and youth's total disability payment amount in the 12 months before the month of random assignment.[15]

To estimate the adjusted impacts of PROMISE, we estimated a regression model of the following form:

$$Y_i = \alpha + \beta Treatment_i + \lambda X_i + \in_i,$$

where i denotes the individual observation, $Treatment_i$ denotes the indicator for assignment to the treatment group, X_i denotes the vector of covariates, and $\in_i$ denotes the error term. The coefficient β denotes the parameter of primary interest.

We used different estimation approaches for the regression analysis depending on the type of outcome measure—whether it was a continuous, binary, or categorial measure. When the outcome was continuous, we estimated this regression using the ordinary least squares method, and β denoted the estimated impact. When the outcome was binary, we estimated the regression by using logistic regression models, then estimated the impact by calculating the average marginal effect implied by our estimate of β. For continuous and binary outcomes, we used two-sided *t*-tests to determine whether the estimated impact was statistically significantly different from zero. When the outcome was categorical, we estimated the regression by using multinomial logistic regression models, then estimated the impact on each category by calculating the average marginal effect on each category implied by our estimate of β. We then used two-sided chi-square tests to determine whether the distribution of estimated impacts was statistically significantly different from zero.

In analyzing PROMISE impacts among youth with ASD, we pooled data for all six PROMISE projects. Because youth with ASD comprise less than 20 percent of youth in the evaluation, small sample sizes inhibited site-level analyses of impacts because of their low statistical power to detect meaningful impacts. Because we were interested in the average impacts of PROMISE and because each of the six PROMISE projects had roughly equal numbers of youth survey respondents, we pooled data for all the projects and did not weight the regressions by project. We addressed the possibility of heteroskedasticity of unknown form by using the method proposed by White (1980) to produce heteroskedasticity consistent standard errors.[16] When examining survey-based outcomes, we specified probability weights in the form of either the parent or youth analysis weight, depending on the source of the outcome data. When examining administrative outcomes, we did not use weights. We specified that the survey sampling had been stratified by local educational agency in California.

To understand whether PROMISE had differently affected youth with ASD than youth with non-ASD impairments, we estimated impacts for each of the two subgroups. To be responsive to the multiple comparisons problem, we only estimated subgroup impacts on primary outcomes. To generate each set of subgroup impacts, we estimated multivariate regression models that included an indicator for each of the relevant subgroups as well as interaction between the subgroup indicators and the treatment indicator. We estimated the following:

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[15] Random assignment was stratified by region at the California and Achieving Success by Promoting Readiness for Education and Employment (ASPIRE) projects. To account for this, we included appropriate region fixed effects.

[16] Heteroskedasticity refers to the circumstance in which the variability of an outcome is unequal across a range of values of a control variable used in the regression model.

$$Y_i = \beta_1 Treatment_i * ASD + \beta_2 Treatment_i * NonASD_i + \beta_3 ASD_i + \beta_4 NonASD_i + \lambda X_i + \in_i,$$

where i denotes the individual observation, ASD_i and $NonASD_i$ denote the indicators for each of the comparison subgroups, $Treatment_i$ denotes the indicator for assignment to the treatment group, X_i denotes the vector of covariates, and $\in_i$ denotes the error term. β_1 and β_2 are the parameters of primary interest because they denote the estimated impact for each of the respective subgroups. We used two-sided *t*-tests to determine whether the estimated impact on each subgroup was statistically significantly different from zero. We also used *t*-tests to assess whether the estimated impacts for youth with ASD and youth with non-ASD impairments significantly differed.

2. Missing data

Because data on the baseline characteristics of enrollees came primarily from administrative data, missing data on baseline characteristics affected only a small share of cases (no more than 5 percent) in each PROMISE project. To avoid excluding cases because of missing baseline data, we imputed values for sample members whose data were missing. For a continuous or binary baseline variable, we replaced the missing observations with the project-specific mean value of the variable computed for the nonmissing observations. For a categorical variable, we added a category to indicate missing data.[17]

We typically excluded observations with missing data on an outcome from the analysis of that outcome. For example, data on some outcome measures based on the PROMISE 18-month survey were missing for some survey respondents because of item nonresponse, and we excluded these cases from the analysis of that measure. For a handful of outcome measures, however, data were missing nonrandomly (that is, data were missing conditional on certain values of other outcome measures), and excluding these observations could lead to a biased measure. For example, some youth reported that they worked for pay in the year preceding the survey but did not provide information on their earnings for this work. Excluding these cases from the analysis of earnings would lead to an underestimate of average earnings. Because PROMISE projects could affect the likelihood of paid employment, excluding the cases with missing data conditional on paid employment could lead to biased estimates of impacts on earnings. To minimize the risk of such bias when we analyzed outcomes for which information could only be missing conditional on another outcome, we used a multiple imputation procedure that enabled us to retain observations that had truly missing data on the outcome to be analyzed.[18]

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[17] For two covariates used in the regression-adjusted impact analysis that were derived from survey data (that is, parents' and youth's race and ethnicity information), we created one category to indicate missing information because of survey or item nonresponse.

[18] We used multivariate imputation by chained equations and predictive mean matching (Raghunathan et al. 2001; Van Buuren 2007; Rubin 1986; Little 1988). For details of the imputation methods, please see Chapter VI of the appendix in Mamun et al. 2019.

IV. Findings

In this section, we describe our findings on the patterns of service receipt among youth with ASD under the status quo (that is, in the control group) and the estimated impacts of PROMISE on their receipt of services, education, employment, and income 18 months after enrollment; we also discuss how these impacts compared with the impacts on youth with non-ASD impairments. We found that many youth with ASD received transition services even without PROMISE projects but that the specific types of services targeted by PROMISE (such as case management, employment-promoting services, benefits counseling, and financial education) and in their families' receipt of support services had room for improvement. Our estimates of the impacts of PROMISE as of 18 months after youth enrolled in the program suggest that PROMISE had substantial impacts on the service receipt, job-related training, employment, and earnings of youth with ASD, but it had no impact on their education, total income, or use of SSA benefit programs. The impacts of PROMISE on the outcomes of youth with ASD were similar to those for youth with non-ASD impairments, except that youth with ASD experienced a smaller relative increase in their receipt of transition services because of PROMISE. We describe these findings in greater detail here, and we also discuss the limitations of our findings.

A. Service receipt among youth with ASD under the status quo

To better understand the context in which youth with ASD experienced PROMISE, we examined the general service environment in which the PROMISE projects operated. To that end, we examined the extent to which the control group youth and their families received transition and support services, since their experiences should approximate service receipt under the status quo, that is, in the absence of PROMISE.[19] In addition, to understand whether service use under the status quo was different for youth with ASD than for youth with non-ASD impairments, we examined service use separately for these two groups and tested for statistically significant differences.

The survey data indicate high levels of transition service use among control group youth (Figure 1). Nearly all control group youth with ASD received some transition services during the 18 months after random assignment (94 percent). This share was larger among youth with ASD than among youth with non-ASD impairments (94 percent versus 89 percent). We also examined control group youth's receipt of a subset of services (that is, case management, employment-promoting services, benefits counseling, and financial literacy) identified as key transition services because they were required of the PROMISE projects. Most control group youth with ASD received at least one key transition service in the 18 months after random assignment; here, too, the share was larger among youth with ASD compared with youth with non-ASD impairments (62 percent versus 57 percent).

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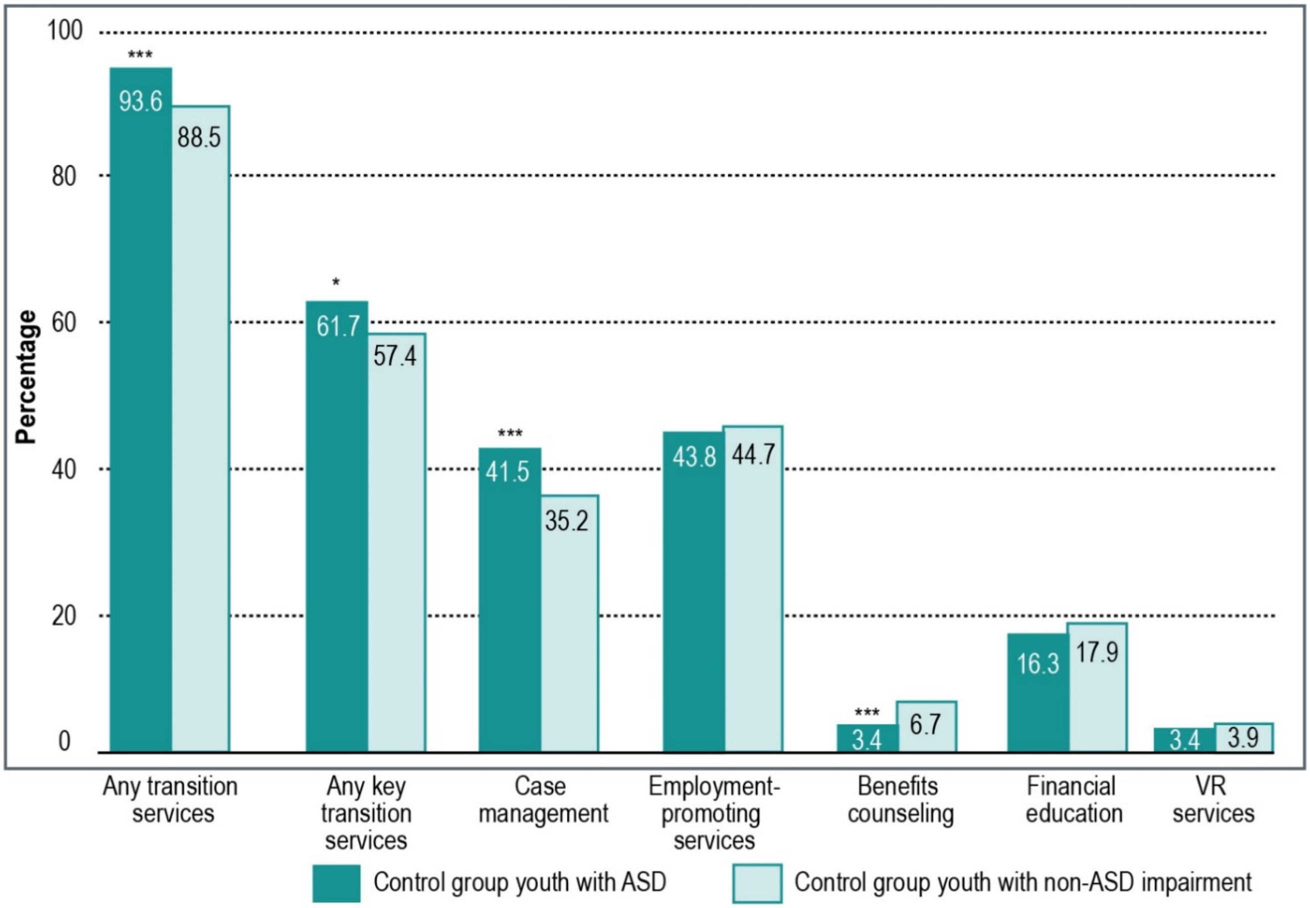
[19] Several factors may have caused systems-level change over the study period, which could have affected service use of all transition-age youth with disabilities. In 2014, the Workforce Innovation and Opportunity Act (WIOA) was enacted, and in 2016, SSA began mailing a brochure to SSI recipients age 14 to 17 with information about the age-18 redetermination process, SSA work supports, and programs relevant to youth with disabilities. Moreover, the interagency collaborations required by the PROMISE initiative (together with WIOA) may have prompted systems changes. The extent to which these factors influenced the likelihood of receiving transition services among both treatment and control group youth is not known.

Figure 1. Share of control group youth who received transition services in the 18 months following study enrollment



*/**/*** The difference is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test.

ASD = autism spectrum disorder; RA = random assignment; VR = vocational rehabilitation.

We investigated youth's receipt of each type of transition service queried in the 18-month survey. For most types of transition services, less than half the control group youth with ASD reported using the service since random assignment.[20] For example, a little under 45 percent of control group youth with ASD received employment-promoting services, which may have included career counseling or assistance with finding or applying for a job, such as help finding jobs available, filling out an application, writing a resume, or going for an interview. Although differences emerged between youth with ASD and non-ASD impairments in their usage of different service types, no clear pattern of differences is apparent. State VR agency data indicate that control group youth (both with ASD and with non-ASD impairments) had low levels of engagement with VR services under the status quo. Among control group youth, about 3 percent of those with ASD and 4 percent of those with non-ASD impairments had received VR services.

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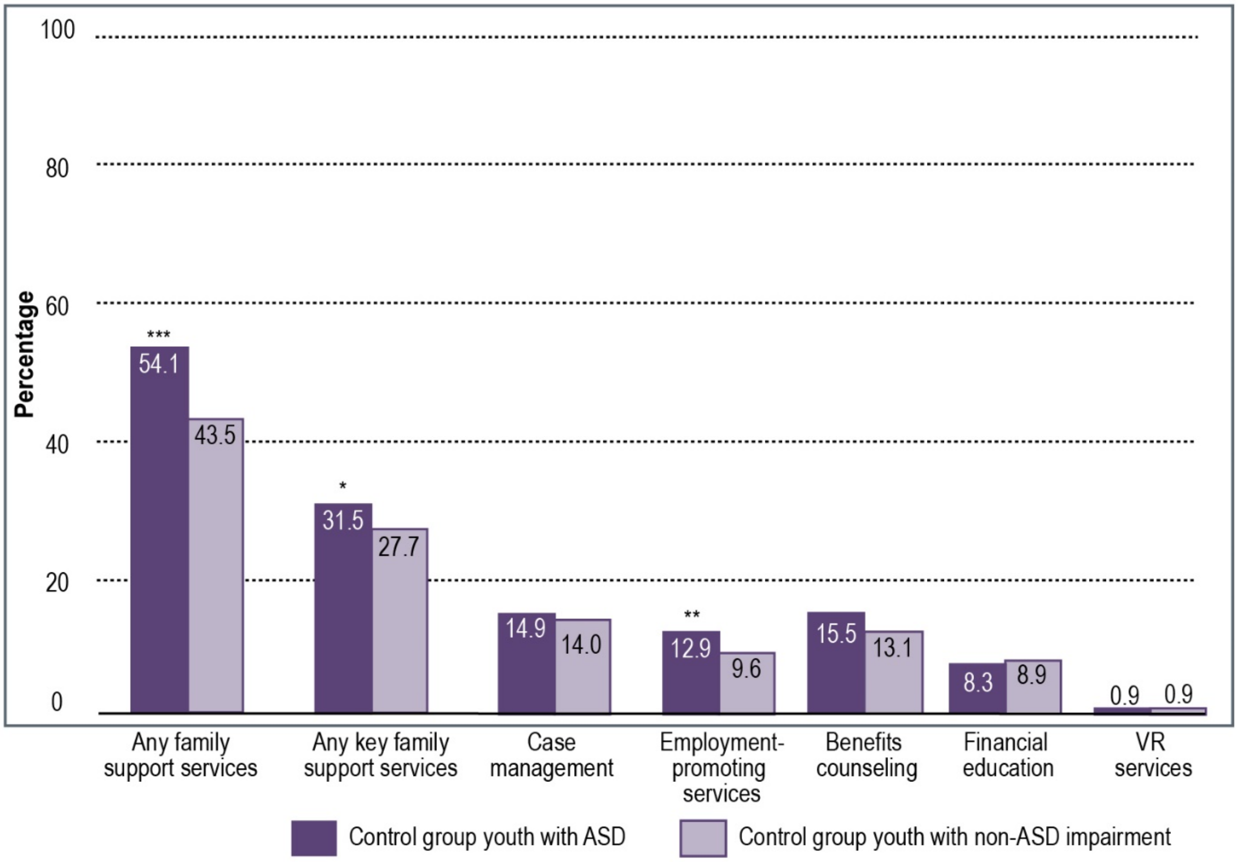
[20] The notable exceptions were school transition planning and life skills training (See Appendix Table A.2). Three quarters of youth with ASD received transition planning designed to help them assess their options and develop strategies for transition. This is consistent with findings from National Longitudinal Transition study that students with autism are the most likely to receive this type of instruction (Cameto et al. 2004).

A little more than half the families of control group youth with ASD reported receiving at least one support service in the 18 months since random assignment (Figure 2). This share was larger than among control group youth with non-ASD impairments (54 versus 44 percent). Similarly, the share of families of control group youth with ASD that received any key support services (that is, services that were required as part of the PROMISE grants) was larger than the share of families of control group youth with non-ASD impairments. About 32 percent of parents of control group youth with ASD reported that their family members received at least one of these key support services during the 18 months after random assignment. This share was about 28 percent among control group youth with non-ASD impairments.

Figure 2. Share of control group families who received support services in the 18 months following study enrollment



*/**/*** The difference is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test.

ASD = autism spectrum disorder; RA = random assignment; VR = vocational rehabilitation.

We also examined families' receipt of each type of service queried in the 18-month survey. It was relatively rare for families of control group youth with ASD to have received any of the services designated as key under the PROMISE logic model, such as case management, employment-promoting services, benefits counseling, or financial education. A larger share of families of control group youth with ASD reported receiving employment-promoting services than families of control group youth with non-ASD impairments did. For other types of services, service receipt levels were similar for both groups. State VR agency data indicate that enrolling parents of control group youth (both with ASD and non-ASD impairments) had almost no engagement with VR services under the status quo; only 1 percent had received VR services since random assignment.

The low levels of service engagement among control group youth and families in many types of transition and support services support a need for programs like PROMISE. For example, youth with ASD and their families could benefit from services that improve their financial well-being but are not likely to receive such services under the status quo. Although youth with ASD understand the importance of financial capability and strive for financial independence, they often lack the skills and support needed to achieve their financial goals (Cheak-Zamora et al. 2017). Figures 1 and 2 show that it was quite rare for control group youth with ASD and their families to receive services such as financial education or benefits counseling that could help them develop these skills. This points to a need for programs and policies like PROMISE—financial education and benefits counseling were key transition services that were required of the PROMISE programs.

Appendix Table A.2 presents additional information on these and other service receipt outcomes for youth in the control group and their families.

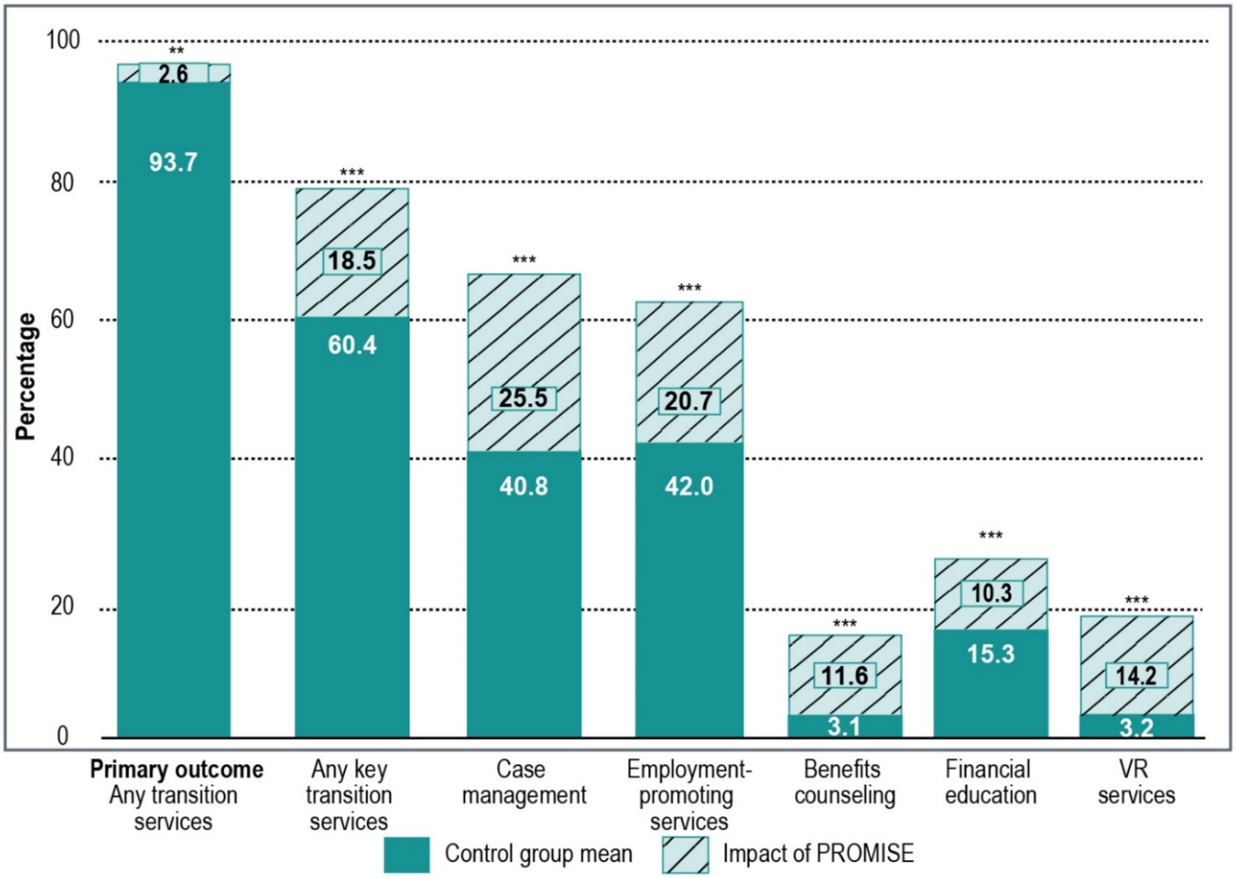
B. Impact of PROMISE on service receipt of youth with ASD

Consistent with the intent of the PROMISE model, the projects increased the use of transition services among youth with ASD (Figure 3). Although the share of youth with ASD receiving transition services was already quite high under the status quo (94 percent), PROMISE increased this share by about 3 percentage points, or 3 percent relative to the control group mean. We also examined whether PROMISE affected the youth's receipt of a subset of key transition services (that is, case management, employment-promoting services, benefits counseling, and financial literacy) and found significant impacts. Among youth with ASD, about 6 in 10 in the control group received at least one key transition service during the 18 months after random assignment; PROMISE increased this share by 19 percentage points (or 31 percent relative to the control group mean).

PROMISE increased the share of youth with ASD who received each type of service queried in the 18-month survey except school transition planning. About 41 percent of youth in the control group received case management services; PROMISE increased this share by 25 percentage points (or 63 percent relative to the control group mean). PROMISE also increased the share of youth who received employment-promoting services (such as career planning, job skills training, help with a job search, and on-the-job supports): about 42 percent of control group youth received them, and PROMISE increased this share by 21 percentage points (or 49 percent relative to the control group mean). PROMISE also increased the share of youth who received an array of other transition services, including benefits counseling, help with financial education, help accessing education or training, self-advocacy or self-determination training, life skills training, help with assistive technology, and other services (Appendix Table A.3). According to state VR agency data, PROMISE significantly increased the participation of youth with ASD in VR services as well. Among control group youth with ASD, 3 percent received VR services during the follow-up period, and PROMISE increased this share by 14 percentage points, representing a substantial increase of 444 percent relative to the control group mean.

These findings suggest that although the PROMISE projects operated in service-rich environments, they still had a meaningful impact on increasing the use of transition services among youth with ASD. The service use impacts among youth with ASD are consistent with the core components of the PROMISE initiative: providing case management, career services and work-based learning, benefits counseling, and financial education and connecting youth with state and local agencies that provide services to youth receiving SSI and their families.

Figure 3. Impacts of PROMISE on the receipt of transition services among youth with ASD

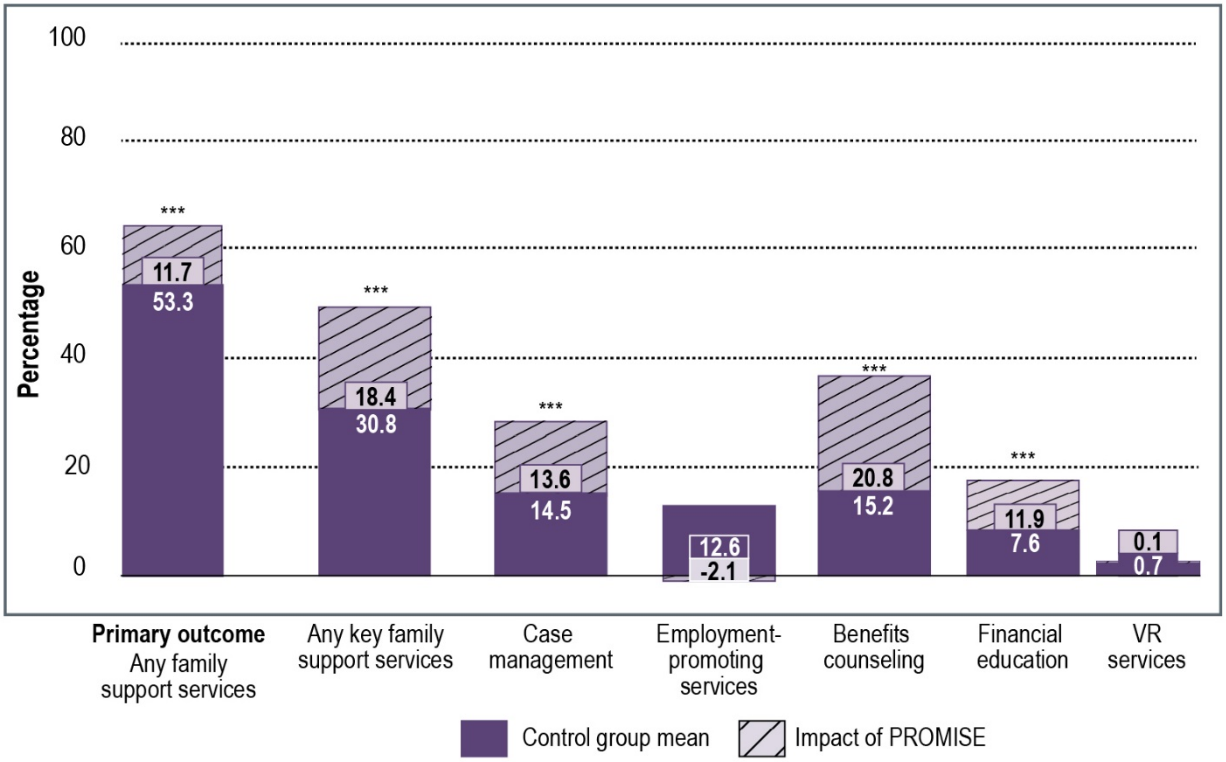


*/**/*** The impact is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test.

ASD = autism spectrum disorder; RA = random assignment; VR = vocational rehabilitation.

PROMISE also increased the use of support services among the family members of youth with ASD (Figure 4). In the control group, a little more than half the families received some support services; PROMISE increased this share by 12 percentage points (or 22 percent relative to the control group mean). It also increased the share of families who received an array of specific services, with particularly large positive impacts on the receipt of case management, benefits counseling, and financial education, which were all key support services for families as designated by the PROMISE logic model. For example, among youth with ASD, PROMISE doubled the share whose families received case management and more than doubled the share whose families received benefits counseling. PROMISE also had positive impacts on the share of youth with ASD whose family members received parent training and information on youth's disability and parent networking support, although these were not key support services. Overall, a little less than one-third of families in the control group received any key support services; PROMISE increased this share by 18 percentage points (or 60 percent relative to the control group mean). Few parents (less than 1 percent) applied for or received VR services during the 18 months after random assignment, and PROMISE did not affect the use of VR services.

Figure 4. Impacts of PROMISE on the receipt of support services among families of youth with ASD



*/**/*** The impact is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test.

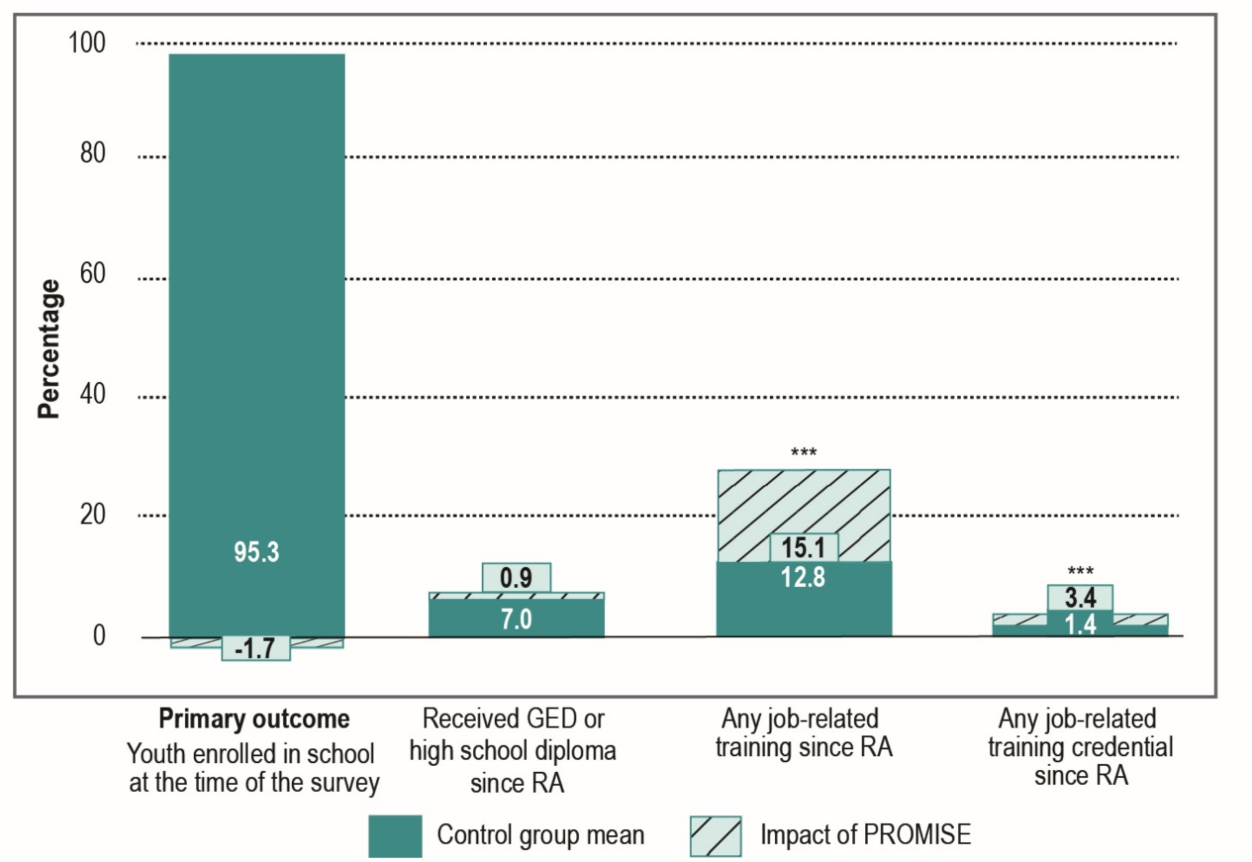
ASD = autism spectrum disorder; RA = random assignment; VR = vocational rehabilitation.

C. Impact of PROMISE on education, employment, and economic well-being of youth with ASD

We found evidence that PROMISE had substantial impacts on the job-related training, employment, and earnings of youth with ASD 18 months after they enrolled, but it had no impact on their education, total income, or reliance on SSA program benefits over that time period.

PROMISE did not affect the education of youth with ASD, but it did increase their receipt of job-related training and training credentials (Figure 5). PROMISE had no impact on whether youth with ASD were enrolled in school at the time of the survey. The absence of an impact is likely explained by the high prevalence of the outcome among control group youth (about 95 percent were enrolled in school), the ages of the youth, and the lack of project services that directly addressed the outcome. PROMISE also did not increase the share of youth with ASD who had received a GED, certificate of completion, or high school diploma since random assignment, which was about 7 percent. For this outcome, the young ages of youth might explain the lack of impacts: at the 18-month follow-up, the average age of youth with ASD was 15 and so most were too young to have achieved these educational milestones, regardless of their eligibility for PROMISE services. PROMISE did, however, significantly increase job-related training among youth with ASD. In the control group, about 13 percent of youth with ASD had attended a training program or taken classes outside of school since random assignment to help them learn job skills or get a job. PROMISE more than doubled this share, increasing it by 15 percentage points. It also had an impact on job-related training credentials: about 1 percent of control group youth with ASD received such credentials and PROMISE increased this share by 3 percentage points, or 243 percent relative to the control group mean. This is an important finding, because past research suggests that although work-related training is predictive of employment, youth with ASD participate in such training at lower levels than children with other disabilities.[21]

Figure 5. Impacts of PROMISE on the education and training of youth with ASD



*/**/*** The impact is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test.

ASD = autism spectrum disorder; RA = random assignment.

PROMISE had a substantial positive impact on the employment and earnings of youth with ASD (Figure 6). In the control group, about 14 percent of youth with ASD reported that they had been employed for pay at some point during the 18 months after random assignment; PROMISE doubled this rate, increasing by 14 percentage points. Similarly, when looking at employment during the year before the survey, PROMISE more than doubled the share of youth who reported engaging in paid employment. Although 11 percent of control group youth with ASD reported paid employment in the past year, PROMISE increased this share by 15 percentage points (or 140 percent relative to the control group mean).

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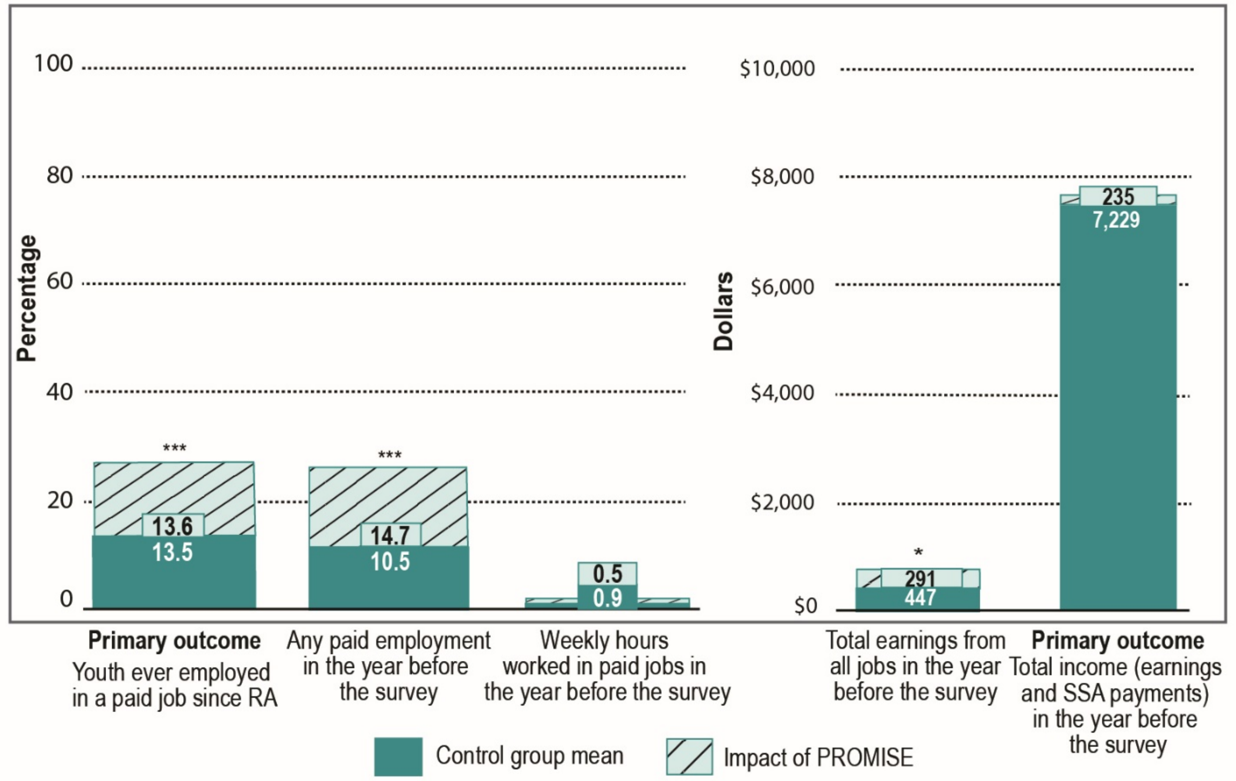
[21] Rast et al. (2020) examined data on transition-age youth in the VR system and found that only about 18 percent of those with ASD received training services to help them improve educationally or vocationally, including educational training for graduate college, 4-year college, junior college, or vocational training. In contrast, nearly a third of youth with other disabilities participated in such training.

PROMISE also increased earnings among youth with ASD. On the 18-month survey, control group youth with ASD reported earning an average of $447 in the past year, and PROMISE increased this amount by $291 (or 65 percent relative to the control group mean). These positive impacts reflect PROMISE's focus on career and work-based learning experiences. PROMISE had no impact on the work hours reported by youth with ASD for the year before the survey, consistent with the finding that nearly all youth were enrolled in school at the time of the survey and therefore likely had constraints on their work hours.

Figure 6. Impacts of PROMISE on the employment, earnings and income of youth with ASD



*/**/*** The impact is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test.

ASD = autism spectrum disorder; RA = random assignment; SSA = Social Security Administration.

We found no evidence that PROMISE had improved the economic well-being of youth with ASD in the 18 months after random assignment. Control group youth with ASD reported about $7,300 in income from earnings and SSA payments in the year before the survey, and PROMISE did not have a significant impact on this amount.[22] The lack of impact on youth's economic well-being might reflect the need for more time to pass for such impacts to manifest. Because of the young ages of the youth in our sample, most were enrolled in school and thus not able to fully engage in the labor market, limiting the potential for substantially reducing their use of SSA payments or boosting their total income. Increases in youth earnings may have led to a reduction in SSI payments because every $2 increase in earnings reduces SSI payments by $1, though because nearly all youth are still in school, many should have been able to use

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[22] We detected an impact of $235 that was not statistically significant but is of a magnitude that is economically significant and consistent with the magnitude of the significant impact on youth's earnings from employment in the year before the survey.

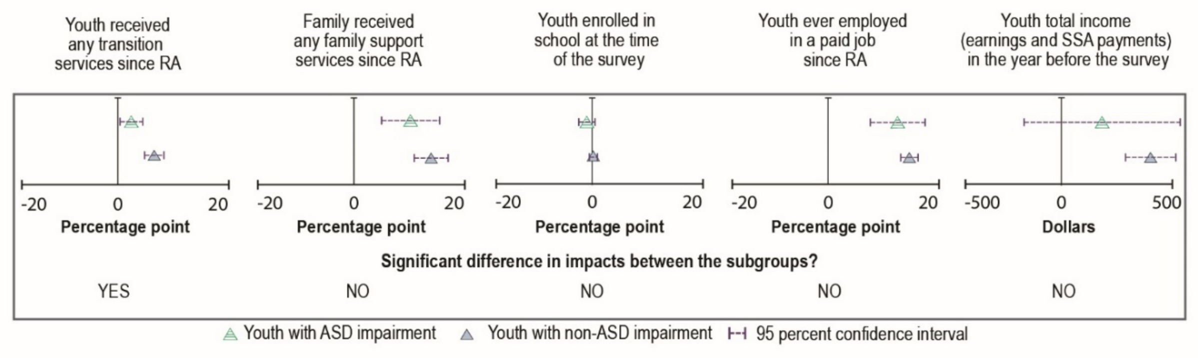
the Student Earned Income Exclusion (SEIE) to avoid reductions in benefits.[23] Longer-term analyses could shed light on whether PROMISE helps youth with ASD increase their income and reduce reliance on public benefits in their adult lives.

Appendix Table A.4 presents additional information on the estimated impacts discussed above and on additional outcomes.

D. Impacts of PROMISE for youth with ASD and non-ASD impairments

We compared the impacts of PROMISE on service use and outcomes among youth with ASD with those of youth with non-ASD impairments (Figure 7).[24] These subgroup analyses are particularly interesting because of the differences in service use between youth with ASD and non-ASD impairments under the status quo and the possibility that services might have different impacts on youth and their families depending on the impairment type. Nonetheless, we found only one statistically significant difference in the impacts between the two groups.

Figure 7. Differences in impacts of PROMISE for youth with ASD and non-ASD impairments



*/**/*** The impact is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test.

ASD = autism spectrum disorder; RA = random assignment; SSA = Social Security Administration.

The impact of PROMISE on youth's receipt of transition services was larger for youth with non-ASD impairments than for youth with ASD. Among youth with ASD, PROMISE increased the share of youth receiving transition services by about 3 percentage points (or 3 percent relative to the control group mean), and among youth with non-ASD impairments, PROMISE increased this share by 7 percentage points (or 8 percent relative to the control group mean). This difference in subgroup impacts could be partially explained by youth with ASD already being more likely to use services under the status quo. For example, among control group youth who had no access to PROMISE, youth with ASD were more likely to receive at least one key transition service, relative to youth with non-ASD impairments (Figure 1). Thus, PROMISE essentially closed the service use gap between youth with ASD and non-ASD

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[23] There is some evidence that SSA does not apply the SEIE in all potentially eligible cases (Government Accountability Office 2017). However, group in the treatment group had access to benefits counseling that may have increased their use of SEIE.

[24] Some youth with non-ASD impairments (based on the primary impairment recorded in the youth's SSA administrative records) may have ASD as a secondary impairment. There are also known racial disparities in ASD diagnoses (Mandell et al. 2009, Becerra et al. 2014). Therefore, our results could be considered lower bounds on the differences between youth with ASD and non-ASD impairments.

impairments; about 96 percent of youth in both groups received transition services if they were eligible for PROMISE services.

For other primary outcomes, there were no statistically significant differences in the impacts between the two subgroups. We summarize the subgroup analysis findings as follows:

- Among youth with ASD, PROMISE increased the share of families receiving some support services by 12 percentage points (or 22 percent relative to the control group mean). Among youth with non-ASD impairments, the share of families receiving support services was smaller under the status quo (44 percent), and PROMISE increased this share by 16 percentage points (or 37 percent relative to the control group mean). Statistical tests, however, indicate that the impacts for these two groups did not significantly differ.
- More than 9 in every 10 youth (both with ASD and with non-ASD impairments) was enrolled in school under the status quo, and PROMISE had no impact on this outcome for either group.
- Compared with youth with ASD, a higher share of youth with non-ASD impairments than with ASD had paid employment in the 12 months after random assignment under the status quo (22 percent versus 14 percent). PROMISE increased this share by 14 percentage points for youth with ASD (a 100 percent increase relative to control mean) and increased this share by 16 percentage points for youth with non-ASD impairments (a 73 percent increase relative to the control group mean). Statistical tests, however, indicate that the impacts for these two groups did not significantly differ.
- Although PROMISE had no impact on total income for youth with ASD, it did have an impact for youth with non-ASD impairments. Control group youth with non-ASD impairments reported an average total income of about $7,700, and PROMISE increased this by about $428 (or 6 percent). Statistical tests, however, indicate that the impacts for these two groups did not significantly differ.

Appendix Table A.5 presents additional information on the estimated impacts discussed above

E. Limitations of the findings

Although we used a rigorous study design to estimate the impacts of PROMISE on youth with ASD, there are some study limitations that readers should know when interpreting the findings.

We present impacts for youth with ASD based on data pertaining to the first 18-months of enrollment in PROMISE, which capture early trends in outcomes. During this period, most youth in our sample had not yet turned age 18. Because of the young age of the sample at the time of data collection and the fact that most were enrolled in school, the lack of impact on youth's education and economic well-being might reflect the need for more time to pass for such impacts to manifest. For example, impacts on outcomes such as high school completion or enrollment in post-secondary education may emerge in the long term as youth grow older. In addition, because nearly all youth were still enrolled in school, they had limited opportunities to work and achieve other milestones of independence. This means that the impacts on employment (and lack of impacts on use of SSA disability program benefits) are unlikely to represent gains in full-time year-round employment, and readers should interpret it with that caveat in mind. In addition, because a paid work experience was a required component of PROMISE services, the positive impacts on employment could represent project outputs more so than impacts. The impacts on paid employment and receipt of job training credentials during this early period are still important, however, because they could lead to long-term effects on employment, income, and economic well-being. For this analysis, we pooled data from the six PROMISE projects. Pooling the data might conceal important heterogeneity in the impacts of PROMISE by projects. Our estimated impacts reflect the *average* effects of the six PROMISE projects for youth with ASD.[25] Each project varied in the way it delivered youth transition services and emphasized family support services, so it is useful to examine whether impacts differed by project. In addition, each project had different challenges and experiences while implementing aspects of PROMISE, some of which were unique to their service environments, such as the nature of the service delivery partnerships they developed. For these reasons, we might expect some heterogeneity in the impacts across the six projects, but we could not examine this because of the small share of youth with ASD.

Features of the PROMISE study population might suggest several ways in which it might not be representative of all youth with ASD, and thus, limit the generalizability of the findings to all youth with ASD:

- Because PROMISE only includes youth receiving SSI, these findings might not generalize to youth with ASD who do not receive SSI (for example, because their families' monthly income is too high for them to be eligible for benefits).
- Any voluntary study is susceptible to the concern that the people who choose to enroll might not represent the general target population. For example, parents of youth with ASD who are highly motivated or have the most urgent service needs might be more likely to enroll than other families to receive services for their youth and themselves.
- We identified the study sample of youth with ASD using the primary impairment code in SSA administrative records, and this code likely does not capture all youth with ASD. Our sample may undercount youth with ASD because the classification of primary versus secondary impairments is susceptible to the subjectivity of claims representatives and may be driven in part by which diagnosis is more sufficient to establish benefit. For example, if youth with diagnoses of both ASD and an intellectual disability more frequently have the latter listed as their primary impairment code, then they might be excluded from our sample. If we assume that youth with diagnoses of both ASD and an intellectual disability have particularly acute functional challenges, this means that our sample disproportionately represents those with higher functional ability among youth with ASD.

Lastly, our analysis can only shed light on the impacts of PROMISE for the average youth with ASD in our sample of youth receiving SSI, and it does not examine how the effectiveness of PROMISE might depend on the varying abilities of youth with ASD. The population of people with ASD is heterogeneous, and adolescents with ASD can have abilities ranging from significant cognitive and language impairments to above-average cognitive and language abilities. Accordingly, the need for services among youth with ASD is likely to vary; some youth might need help with employment supports and financial education, and others might be most in need of help with assistive technology and life skills training. The effectiveness of any intervention might differ in relation to the abilities of the youth with ASD (Machalicek et al. 2008). Because we do not have any baseline data on youth's abilities beyond their primary disability diagnosis, we cannot determine how the impacts of PROMISE might vary with youth's abilities.

To qualify for SSI based on a primary impairment of ASD, people must provide SSA with medical documentation of (1) qualitative deficits in verbal communication, nonverbal communication, and social

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[25] We did not weight the sites in the analysis. Sample sizes of survey respondents from the six sites were roughly similar. Because CaPROMISE enrolled significantly more youth than the other sites, analysis of outcomes based solely on administrative data have a larger proportion of enrollees from CaPROMISE relative to the other sites.

interaction; (2) significantly restricted, repetitive patterns of behavior, interests, or activities; and (3) either an extreme limitation of one or a marked limitation of two of the following areas of mental functioning: understanding, remembering, or applying information; interacting with others; concentrating, persisting, or maintaining pace; adapting or managing oneself. Because of SSA's eligibility criteria, however, our sample of youth receiving SSI likely excludes youth with high abilities, which would suggest that the positive impacts of PROMISE are not limited to those youth who have above-average cognitive or other abilities (Social Security Administration n.d.).

V. Conclusion

The overarching goal of PROMISE was to support the long-term economic self-sufficiency of youth who receive SSI by increasing their education and employment. The design of the PROMISE projects included partnership and coordination between state agencies and the provision of a core set of transition and support services for youth and their families to address the personal and environmental factors believed to influence the educational, employment, and financial outcomes of youth receiving SSI and their families. The national evaluation of PROMISE used a random assignment design to estimate the impact of each of the six projects. This report presents findings from our analysis of impacts on the outcomes of adolescent youth with ASD and their families 18 months after their enrollment in the evaluation.

Our examination of the service experiences of the control group suggests that the business-as-usual environment (without the program) in the PROMISE states was not particularly service-poor. In other words, the states did not lack in opportunities for youth with ASD to engage in at least some type of transition services, particularly those such as school transition planning, which the majority of youth received. However, our findings suggest that many youth with ASD are not receiving some important types of services under the status quo. For example, fewer than 1 in every 20 control group youth with ASD received benefits counseling, despite its importance for helping youth and families navigate public programs (for example, understanding bundled or categorical eligibility for programs) and addressing the fear of losing benefits as a barrier to youth's employment. Similarly, we found considerable room for improvement in the provision of support services for families. Over two-thirds of the families of control group youth with ASD did not receive any key support services under the status quo.

PROMISE significantly increased the likelihood that youth with ASD and their families received transition and family support services. Moreover, the impacts on youth and families' service receipt were relatively large. Using the example described above, while only about 3 percent of control group youth with ASD received benefits counseling, PROMISE increased this share by nearly four-fold. For both youth transition services and family support services, the impacts of PROMISE were particularly large for the key services that were the focus of the PROMISE projects, such as case management, employment-promoting services, benefits counseling, and financial education. This suggests that the required focus on the core PROMISE support services resulted in a greater share of families receiving those services

The positive impacts on youth and family service use suggest that the PROMISE model of service delivery through inter-agency collaborations and centralized case management was effective for youth with ASD. The PROMISE initiative aimed to encourage partnerships among service providers and agencies at the federal, state, and local levels, and our findings suggest that such collaborations, along with the case management function, were fruitful in connecting youth to services and increasing the likelihood that they received certain types of transition services. A prime example of this is in the area of VR services, which youth with ASD have traditionally underused. Our findings suggest that PROMISE increased the share of youth who received VR services nearly five-fold. Although we did not have data on the outcomes of their VR engagement, this finding could indicate future involvement in employment, because recent estimates suggest that about 60 percent of people with autism who use VR services leave VR with employment (Roux et al. 2016). Our findings support the importance of coordination across agencies serving transition-age youth with ASD and such coordination is likely to improve due to the promulgation of the Workforce Innovation and Opportunity Act, which includes requirements intended to promote greater collaboration between ED, DOL, and other agencies involved in overseeing services for youth with disabilities.

We found evidence that PROMISE projects had substantial impacts on the job-related training, employment, and earnings of youth with ASD, but it did not have any impact on their education, total income, or reliance on SSA program benefits. We did not detect any differences between the treatment and control groups in the school enrollment rates or high school completion rates of youth with ASD. PROMISE did, however, connect more youth with job-related training, increasing the share who had attended a training program or taken classes outside of school since random assignment to help them learn job skills or get a job and the share that had received credentials from such a program. PROMISE also more than doubled the share of youth who had been employed since random assignment or in the year before the 18-month survey. These positive impacts on employment, however, did not translate into impacts on youth's total income or use of SSA program benefits.

When interpreting these positive impacts on employment and earnings, readers should keep in mind that PROMISE projects had to ensure that participating youth had at least one paid work experience in an integrated setting while they were in high school. Therefore, the impacts on employment and earnings shortly after random assignment might reflect outputs of the program. Although the current analysis cannot shed light on youth's long-term employment, this is an important area for further research, because people with ASD are noted to display chronic unemployment after short employment experiences (Wehman et al. 2014a). In the future, analyses of data from the planned 60-month survey could help us understand whether PROMISE had a meaningful and persistent impact by helping youth with ASD get on a path of consistent paid employment, ideally in competitive integrated settings.[26]

Because our study is based on 18-month follow-up data, the findings presented here reflect the initial state of outcomes of youth and their families. As part of the national evaluation, Mathematica is collecting survey and administrative data on the outcomes of youth and their families five years after their enrollment in PROMISE. These data could shed light on the long-term persistence of the impacts documented in this report as well as the emergence of new impacts. Future research can use the five-year follow-up data to explore the extent to which PROMISE resulted in meaningful improvements in the longer-term economic well-being and self-sufficiency of youth with ASD and their families.

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[26] Many believe that competitive, integrated employment is the best outcome for adults with disabilities (Siperstein et al. 2014; Workforce Innovations and Opportunity Act of 2014, § 113–128), and recent evidence suggests that people with ASD can successfully work in competitive, integrated jobs and earn significantly more than they can in segregated work or day support programs (Cimera 2011; Howlin 2013; Howlin et al. 2005; Schall et al. 2015; Wehman et al. 2012, Wehman et al. 2014b).

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Appendix A:

Technical Appendix

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Table A.1. Baseline characteristics of PROMISE-enrolled youth with ASD in the program and in control groups (percentage unless otherwise noted)

	Program group youth with ASD (A)	Control group youth with ASD (B)	Difference (A - B)	p-value
Demographic characteristics				
Youth's sex is female	16.1	17.1	-1.0	0.66
Youth's age at random assignment:				0.95
14	42.3	42.1	0.2	
15	26.6	27.4	-0.8	
16	31.2	30.6	0.6	
Average age	15.3	15.3	0.0	0.91
Youth's language preference at SSI application				
English is preferred written language	79.8	79.5	0.3	0.90
English is preferred spoken language	80.2	79.3	0.9	0.72
Youth's living arrangement at SSI application				0.91
In parents' household	83.5	84.3	-0.8	
Own household or alone	14.0	13.1	0.9	
Another household and receiving support	2.5	2.5	-0.1	
Youth's race and ethnicity (from the 18-month survey)				0.49
Non-Hispanic White	31.2	25.8	5.3	
Non-Hispanic Black	20.5	20.5	-0.0	
Hispanic	36.8	40.8	-4.0	
Non-Hispanic American Indian	1.0	1.2	-0.2	
Non-Hispanic other or mixed race	7.7	8.5	-0.8	
Missing	2.9	3.2	-0.3	
Enrolling parent's age (from the random assignment system)	44.7	44.4	0.3	0.57
Parent's race and ethnicity (from the 18-month survey)				0.28
Non-Hispanic White	34.2	30.0	4.2	
Non-Hispanic Black	21.2	19.7	1.6	
Hispanic	35.4	38.3	-2.9	
Non-Hispanic American Indian	1.1	1.5	-0.4	
Non-Hispanic other or mixed race	6.9	8.0	-1.1	
Missing	1.1	2.5	-1.4	
Disability				
Youth's primary impairment [a]				0.00***
Intellectual or developmental disability	99.2	98.6	0.5	
Speech, hearing, or visual impairment				
Physical disability		0.2		
Other mental impairment [b]	0.3	0.5	-0.1	
Other or unknown disability	0.5	0.7	-0.3	

	Program group youth with ASD (A)	Control group youth with ASD (B)	Difference (A - B)	p-value
SSA program participation				
Received SSI	94.5	94.9	-0.4	0.76
Received OASDI	8.3	9.1	-0.8	0.65
Years since youth's earliest SSI eligibility at random assignment	9.1	8.8	0.2	0.27
Youth's age at most recent SSI application	7.1	7.0	0.0	0.84
Youth payments in year before random assignment ($)				
SSI	7,038	7,146	-108	0.42
OASDI	260	293	-34	0.61
Total SSI and OASDI	7,297	7,439	-141	0.26
Household has multiple SSI-eligible children	16.6	17.4	-0.8	0.72
Number of youth	569	603		

Source: SSA administrative data unless otherwise noted.

Notes: The sample includes all youth who completed the PROMISE 18-month youth survey. We identified youth with ASD based on their primary impairment recorded in SSA administrative records at the end of the PROMISE enrollment period. We weighted statistics to adjust for survey nonresponse. Youth living arrangements recorded as "living in own household or alone" in the SSA data include living in a residential facility, foster care, another relative's household but paying a fair share of expenses, and in one's own household. The *p*-value for a continuous or binary variable is based on a two-tailed *t*-test. The *p*-value for a multinomial categorical variable, which we present in the row for the first category, is based on a chi-square test across all categories.

[a] Primary impairment is based on the primary impairment recorded in the youth's SSA administrative records at the time of random assignment. In a few cases, the primary disability diagnosis code changed between the time of random assignment and the end of the PROMISE enrollment period because of redeterminations or continuing disability reviews.

[b] Other mental impairments include conditions such as chronic brain syndrome; schizophrenia; borderline intellectual functioning; and affective, anxiety, personality, substance addiction, somatoform, eating, conduct, oppositional/defiant, and attention-deficit/hyperactivity disorders.

*/**/*** The difference is significantly different from zero at the .10/.05/.01 level.

ASD = autism spectrum disorder; OASDI = Old-Age, Survivors, and Disability Insurance; PROMISE = Promoting Readiness of Minors in SSI; SSA = Social Security Administration; SSI = Supplemental Security Income.

Table A.2. Receipt of youth transition and family support services under the status quo (percentage unless otherwise noted)

	Control group youth with ASD	Control group youth with non-ASD impairment	Difference	p-value
Youth's receipt of transition services				
Received any transition services since RA	93.6	88.5	5.1	0.00***
Received any key transition services since RA	61.7	57.4	4.3	0.05*
Types of services received since RA (italics indicate key transition services)				
Case management[a]	41.5	35.2	6.3	0.00***
School transition planning	75.4	68.6	6.8	0.00***
Employment-promoting services[a]	43.8	44.7	-0.9	0.68
Benefits counseling[a]	3.4	6.7	-3.3	0.00***
Financial education[a]	16.3	17.9	-1.6	0.35
Self-advocacy or self-determination training	41.7	37.4	4.3	0.06*
Help accessing education or training	24.9	31.6	-6.7	0.00***
Life skills training	56.4	49.2	7.2	0.00***
Help with assistive technology	28.8	23.7	5.1	0.01**
Other services	8.0	6.8	1.2	0.32
VR services (from state VR agency data)				
Applied for VR services since RA	6.5	6.0	0.5	0.60
Received VR services since RA	3.4	3.9	-0.5	0.45
Families' receipt of support services				
Received any family support services since RA	54.1	43.5	10.6	0.00***
Received any key family support services since RA	31.5	27.7	3.8	0.07*
Types of family support services received since RA (italics indicate key support services)				
Case management[a]	14.9	14.0	0.9	0.58
Education or training supports	12.2	10.6	1.6	0.30
Employment-promoting services[a]	12.9	9.6	3.3	0.03**
Benefits counseling[a]	15.5	13.1	2.4	0.15
Financial education[a]	8.3	8.9	-0.6	0.63
Parent training and information on youth's disability[a]	33.4	25.2	8.2	0.00***
Parent networking support	20.4	14.2	6.2	0.00***
Enrolling parent's engagement with VR services (from state VR agency data)				
Applied for VR services since RA	0.9	1.5	-0.6	0.17
Received VR services since RA	0.9	0.9	-0.0	0.96

Source: PROMISE 18-month survey unless otherwise noted.

Note: We identified youth with ASD based on whether their primary impairment recorded in SSA administrative records was "Autistic disorders" at the end of the PROMISE enrollment period. The sample comprised 812 control group youth with ASD and 5,431 control group youth with non-ASD impairments, although some outcomes might have different samples because of item nonresponse. For outcomes measured with data from the PROMISE 18-month survey, we weighted statistics to adjust for survey nonresponse. The *p*-values are based on a two-tailed *t*-test.

[a] We identified these services as key transition services because PROMISE projects had to offer them. The PROMISE 18-month survey included more detailed questions about providers of these services than about providers of other services.

*/**/*** The difference is significantly different from zero at the .10/.05/.01 level.

ASD = autism spectrum disorder; PROMISE = Promoting Readiness of Minors in SSI; RA = random assignment; SSA = Social Security Administration; SSI = Supplemental Security Income; VR = vocational rehabilitation.

Table A.3. Impacts of PROMISE on service receipt for youth with ASD (percentage, unless otherwise noted)

Outcome	Control mean	Impact of PROMISE	p-value
Youth's receipt of transition services			
Received any transition services since RA	93.7	2.6	0.05**
Received any key transition services since RA	60.4	18.5	0.00***
Types of services received since RA (italics indicate key transition services)			
Case management[a]	40.8	25.5	0.00***
School transition planning	75.8	-2.2	0.39
Employment-promoting services[a]	42.0	20.7	0.00***
Benefits counseling[a]	3.1	11.6	0.00***
Financial education[a]	15.3	10.3	0.00***
Self-advocacy or self-determination training	40.1	6.3	0.03**
Help accessing education or training	22.3	10.9	0.00***
Life skills training	56.3	6.2	0.03**
Help with assistive technology	28.3	5.6	0.04**
Other services	7.5	5.8	0.00***
VR services (from state VR agency data)			
Applied for VR services since RA	6.3	19.0	0.00***
Received VR services since RA	3.2	14.2	0.00***
Families' receipt of support services			
Received any family support services since RA	53.3	11.7	0.00***
Received any key family support services since RA	30.8	18.4	0.00***
Types of family support services received since RA (italics indicate key support services)			
Case management[a]	14.5	13.6	0.00***
Education or training supports	11.4	1.1	0.56
Employment-promoting services[a]	12.6	-2.1	0.28
Benefits counseling[a]	15.2	20.8	0.00***
Financial education[a]	7.6	11.9	0.00***
Parent training and information on youth's disability[a]	32.8	9.1	0.00***
Parent networking support	19.9	7.1	0.00***
Enrolling parent's engagement with VR services (from state VR agency data)			
Applied for VR services since RA	0.7	1.0	0.15
Received VR services since RA	0.7	0.1	0.76

Source: PROMISE 18-month follow-up survey unless otherwise noted.

Notes: We identified youth with ASD based on whether their primary disability diagnosis code in SSA administrative records was "Autistic disorders" at the end of the PROMISE enrollment period. Bold text indicates primary outcomes. The sample comprised 812 control group youth with ASD and 753 treatment group youth with ASD, although specific outcomes might have smaller samples because of item nonresponse. For outcomes measured with data from the PROMISE 18-month survey, we weighted statistics to adjust for survey nonresponse. The *p*-values are based on a two-tailed *t*-test.

[a] We identified these services as key transition services because PROMISE projects had to offer them. The PROMISE 18-month survey included more detailed questions about providers of these services than about providers of other services.

*/**/*** The impact estimate is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test.

ASD = autism spectrum disorder; PROMISE = Promoting Readiness of Minors in SSI; RA = random assignment; SSA = Social Security Administration; SSI = Supplemental Security Income; VR = vocational rehabilitation.

Table A.4. Impacts of PROMISE on other outcomes of youth with ASD (percentage unless otherwise noted)

Outcome	Control mean	Impact of PROMISE	p-value
Education and job-related training			
Youth enrolled in school at the time of the survey	95.3	-1.7	0.23
Received GED, certificate of completion, or high school diploma since RA	7.0	0.9	0.60
Job-related training since RA			
Received any job-related training	12.8	15.1	0.00***
Received any job-related training credential	1.4	3.4	0.00***
Employment and earnings			
Youth ever employed in a paid job since RA	13.5	13.6	0.00***
Employment in the year before the survey			
Any paid employment	10.5	14.7	0.00***
Weekly hours worked in paid jobs	0.9	0.5	0.10
Total earnings from all jobs ($)	447	291	0.09*
Economic well-being			
Youth total income (earnings and SSA payments) in the year before the survey ($)	7,299	235	0.26
SSA payments in 18-month period since RA (from SSA data)			
Received any SSA payments	97.3	0.1	0.93
Total SSA payments ($)	10,628	-142	0.29
Type of SSA payments received			0.98
SSI only	85.8	-0.0	
SSI and OASDI	10.3	0.0	
OASDI only	1.2	-0.2	
None	2.7	0.2	

Source: PROMISE 18-month follow-up survey and SSA administrative records.

Notes: We identified youth with ASD based on whether their primary disability diagnosis code in SSA administrative records was “Autistic disorders” at the end of the PROMISE enrollment period. Bolded entries indicate primary outcomes. The sample comprised 819 control group youth with ASD and 769 treatment group youth with ASD, although specific outcomes might have smaller samples because of item nonresponse. For outcomes measured with data from the PROMISE 18-month survey, we weighted statistics to adjust for survey nonresponse. The *p*-value for a continuous or binary variable is based on a two-tailed *t*-test. The *p*-value for a multinomial categorical variable, which we present in the row for the first category, is based on a chi-square test across all categories.

*/**/*** The impact estimate is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test or a chi-square test.

ASD = autism spectrum disorder; OASDI = Old-Age, Survivors, and Disability Insurance; PROMISE = Promoting Readiness of Minors in SSI; RA = random assignment; SSA = Social Security Administration; SSI = Supplemental Security Income; VR = vocational rehabilitation.

Table A.5. Impacts of PROMISE on youth outcomes, by whether youth has ASD (percentage unless otherwise noted)

	Youth with ASD			Youth with non-ASD impairment			
Outcome	Control mean	Impact of PROMISE	*p*-value	Control mean	Impact of PROMISE	*p*-value	p-value for subgroup difference
Youth received any transition services since RA	93.7	2.7	0.04**	88.5	7.0	0.00***	0.00+++
Family received any family support services since RA	53.3	11.7	0.00***	43.5	16.3	0.00***	0.13
Youth enrolled in school at the time of the survey	95.3	-1.7	0.22	90.6	-0.3	0.67	0.36
Youth ever employed in a paid job since RA	13.5	14.0	0.00***	21.9	16.1	0.00***	0.43
Youth total income (earnings and SSA payments) in the year before the survey ($)	7,299	258	0.22	7,675	428	0.00***	0.45

Source: PROMISE 18-month follow-up survey and SSA administrative records.

Notes: We identified youth with ASD based on whether their primary impairment recorded in SSA administrative records was “Autistic disorders” at the end of the PROMISE enrollment period. We conducted subgroup analyses only on primary outcomes. The sample comprised 605 youth with ASD and 4,155 youth with non-ASD impairments in the control group youth as well as 586 youth with ASD and 4,330 youth with non-ASD impairments in the treatment group, although some outcomes might have different samples because of item nonresponse. For outcomes measured with data from the PROMISE 18-month survey, we weighted statistics to adjust for survey nonresponse. The *p*-values are based on a two-tailed *t*-test.

*/**/*** The difference is significantly different from zero at the .10/.05/.01 level using a two-tailed *t*-test.

ASD = autism spectrum disorder; PROMISE = Promoting Readiness of Minors in SSI; RA = random assignment; SSA = Social Security Administration; SSI = Supplemental Security Income.

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