

Project Twice Exceptional with Autism Spectrum Disorder (2E-ASD): Table of Contents

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Project 2E-ASD: Narrative

Introduction

We know very little about students who have talents and Autism Spectrum Disorder (ASD), as little research exists and that which is available, is often based on studies with small numbers. Parents, teachers, and students themselves need evidence-based advice and support. As noted later in this narrative, students who have academic talents, but also ASD are often unable to thrive academically in many school settings, and may feel isolated, lonely, and depressed. This project will contribute research about students who are often ignored in the literature, but are at great risk for underachieving, dropping out of high school and college, and most important, failing to realize and develop their talents. We will produce evidence-based guidance and resources to improve practice. We believe that this project constitutes a seminal study about a group of young people who have much to contribute, but struggle to access the advanced and enriched education necessary to do so.

The central goals of Project 2E-ASD are:

- to identify research-based characteristics of academically talented students with Autism Spectrum Disorders (hereafter referred to as 2E-ASD) who are sophomores and juniors in high school, and develop a research-based identification system,
- to conduct research about their academic needs and strengths and whether these are addressed and met in their high schools,
- to identify advanced-level high-end learning and enrichment teaching strategies that enable these students to succeed in high school and successfully transition to college,
- to subsequently teach these evidence-based instructional practices to students directly (in a residential summer program) and subsequently to their high school teachers (using

professional development modules developed by effective high school teachers and the research team),

- to increase students' likelihood for academic success in both high school and college by investigating whether participation in the summer program with additional supports produces better outcomes for students who are 2E-ASD,
- to investigate how to change teacher behaviors and instructional strategies to have them better prepared to meet the needs of 2E-ASD students, and
- to develop research-based materials including scholarly articles, technical reports, curricula, professional development materials, websites, and videos.

Need for the Project

Statistics on the rapid increase in the number of students with ASD point to the clear need for this project. In 2014, according to the Centers for Disease Control and Prevention, 1 in 59 children were identified with ASD (Baio et al., 2018), an increase from 1 in 150 in the year 2000. These increases are reflected in the number of students with ASD who receive special education services nationally, with the number increasing from 1.5% of the total percentage of students in 2000-2001 to 9% in 2015-2016 (National Center for Education Statistics, 2016, 2018). Data about percentages of high functioning students with ASD who attend and either leave or graduate from college are difficult to obtain, but some trends are available. For example, data from the National Longitudinal Transition Study-2 indicates that 34.7% of youth with ASD transitioned to postsecondary education, with most (28%) attending 2-year colleges (Shattuck et al., 2012).

Academic Challenges Facing Students who are 2E-ASD

We know very little about how many 2E students are actually identified and served in the United States, and even less about students who are 2E-ASD students. We do know that many

students experience difficulties in school due to learning differences, and that instruction for high ability students with disabilities is too-often deficit-based, as remediation and behavior plans comprise the focus of most interventions (Crim, Hawkins, Ruban, and Johnson, 2008). Crim and colleagues studied the Individualized Education Programs (IEPs) of 1055 students receiving services for specific learning disabilities, and found that of this group, 112 were identified as high-ability students. Not one of these 2E students was either nominated for gifted and talented services or recommended to receive any advanced or differentiated type of educational modifications that addressed their abilities or talents. Currently, we do not have similar research on the IEP's of students who are 2E-ASD. These findings and other research suggest that teachers frequently have little to no preparation to identify and teach academically talented students (McBee, Peters, & Miller, 2016) and even less skill in identifying or teaching students who are 2E-ASD. No studies have investigated evidence-based best practices for supporting 2E-ASD students in high school when they may be enrolled in challenging courses and we know little about teaching the skills necessary for their academic success in high school and beyond (Anderson Carter, & Stephenson, 2018; Gelbar, Shefcyk, & Reichow, 2015; Shattuck et al., 2012; Wei, Wagner, Hudson, Ya, & Javitz, 2016).

Academic Progress of High School Students who are 2E-ASD

Despite gains in access to postsecondary education, students with ASD currently enroll at lower rates than their peers with other types of disabilities (Gelbar et al., 2015; Shattuck et al., 2012; Wei et al., 2016), and they leave college programs prior to completion at higher rates than their peers (White, Ollendick, & Bray, 2011). As noted by Wei et al. (2016), “this low rate of college participation has significant economic and personal costs for youth with ASD, their families, and society” (p. 3). Several researchers note that the number of students with ASD

attending college will continue to increase in the coming years, as the overall prevalence of children with ASD increases and these students enter adulthood (Gelbar et al., 2015; Gurbulz, Hanley, & Riby, 2019; Hotez et al., 2018; Shattuck et al., 2012). However, little research exists to date about students who are 2E-ASD and their high school experiences, including how many are identified as gifted and talented; how many succeed academically in high school; the types of learning, study, and interpersonal strategies that enable them to succeed academically, or other high school experiences that contribute to their academic success.

Academic and Personal Issues Faced by Students who are 2E-ASD

Some students with ASD succeed in high school and persist in college, although at lower rates than their non-disabled peers (38% v. 51%; Newman et al., 2011). Although many students with ASD have strong academic skills or are less likely to report difficulty accessing academic content (Anderson et al., 2018; Gelbar et al., 2015), their non-academic skills are problematic, including: struggles with anxiety and depression; social isolation and loneliness; poor sleep; lack of structure and organization; and poor planning and time management skills (Anderson et al., 2018; Gelbar et al., 2015; Gurbuz et al., 2019; White et al., 2011). The 2016 Higher Education Research Institute study of American freshmen reported that 53.9% of students with ASD reported frequently feeling anxious, and 29.7% reported frequently feeling depressed (Eagan et al., 2017). Anderson and colleagues found that college students with ASD found support services helpful, but only accessed them occasionally. Gurbuz and colleagues reported that 56% of students with ASD have difficulty adjusting to their institution and considered taking a break from their studies or withdrawing.

Characteristics and Strengths of Students who are 2E-ASD

While the research base concerning 2E-ASD is small and limited, it indicates that the characteristics of these students mirror the experiences of other twice-exceptional students in that the interaction of their strengths and challenges is similar to other gifted individuals on certain characteristics and similar to other individuals with ASD in different ways (Burger-Veltmeijer, Minnaert, & Van den Bosch, 2016). For example, 2E-ASD students outperform non-gifted ASD students on the Calculations, Applied Problems, and Passage Comprehension sections of the Woodcock Johnson-III subtests over time (Cain et al., 2019). Cain and colleagues also noted that 2E-ASD students academically outperformed non-gifted ASD students throughout so the academic performance of 2E-ASD is similarly to other gifted students. Similar to non-gifted individuals with ASD, Rubenstein, Pierson, Wilczynski, and Connolly (2013) note: “there tends to be a great discrepancy among ability test subscales within gifted students on the spectrum.” (p. 913). Further, gifted students with ASD face similar social difficulties as non-gifted students with ASD (Burger-Veltmeijer & Minnaert, 2011).

Strength-based Pedagogy for Students who are 2E-ASD

As noted earlier, teachers usually have little to no background in how to identify and/or teach academically talented students (Archambault, Westberg, Brown, Hallmark, Emmons, & Zhang, 1993; McBee et al., 2016) and most likely, even less preparation to identify or teach high potential or academically talented students with ASD. Moreover, no research has been conducted on whether academically talented students with ASD can be taught or learn strategies to increase their academic success in high school and subsequently in college. While the research on successful interventions for this population is sparse, preliminary evidence suggests the need to focus on strengths and interests (Baum, 1988; Baum, Renzulli, & Hébert, 1995; Baum, Schader,

& Hébert, 2014; Cooper, Baum, & Neu, 2004). Baum and colleagues learned that when educators implement strength-based programs to identify and develop individual gifts and talents, 2E students can thrive academically in elementary and secondary school (Baum et al., 2014). In other words, as educators reduce their attention to the disabilities and focus on students' strengths and interests, academically talented students with disabilities become more engaged in school and more successful in academic and creative work in areas of personal choice and interest. For example, one Javits project, Project High Hopes (Baum, Cooper, & Neu, 2001), based on the Schoolwide Enrichment Model (SEM, Renzulli & Reis, 1985, 1997, 2014), was designed to enable academically talented students with disabilities to use their strengths in creativity, problem-solving skills, and analytic ability in order to benefit from interest-based enrichment. Results of this program and more current work by Baum et al. (2014) showed strong and consistent academic and creative accomplishments in students. Project 2E-ASD will build off this work and will integrate various enrichment and talent development strategies identified in previous research into the instructional and personal strategies identified in our research with effective teachers to develop research-based methods and strategies for teaching students who are 2E-ASD. We will embed the teaching of these strategies into a pre-existing two-week residential Pre-college Summer Program with other high school students and subsequently into a professional development module for teachers of this population of students.

This summer residential program, coupled with appropriate counselor coaching and scaffolding, will provide students who are 2E-ASD with experiential learning of these skills for academic success and enhance their self-determination and ability to work independently and in a group. Current research has found that when 2E-ASD students are engaged in purposeful enriched learning, they are more willing to collaborate in a group with others, and contribute

their talents and expertise creating a more successful academic learning experience (Baum et al., 2014). These elements can also be discussed in debriefing sessions with 2E-ASD students to create further awareness of the need for enhanced and modified strategies for self-regulation. A residential program with appropriate counselor coaching, separate and engaged classes, and scaffolding will also provide these students with experiential learning about the skills needed for independent college living.

This project builds upon other work in gifted education, such as research funded by Javits and conducted by Reis, Neu, and McGuire (1995) that identified negative experiences that academically talented students with learning disabilities experience in school. Students with disabilities, particularly those with ASD, may exhibit challenging behaviors, and also manifest their talents in diverse ways. In previous research, one approach that was found to be successful for engaging these learners was an enrichment approach based on interests and gaining an understanding of one's talents and goals, as suggested in the Schoolwide Enrichment Model (SEM) and Baum's adaptation of the SEM, called the Talent Centered Model (Baum et al., 2014; Renzulli & Reis, 1985, 1997, 2014). We will integrate talent development strategies identified in this previous research into the successful teaching strategies that will be used with this population. Strategies will include identification of interests, opportunities to consider students preferred modes of learning (projects, simulations, working independently or in groups), and their preferred expression or product styles, as well as the personal strategies to support their talents and academic strengths.

Project Design

We will use several different research methods in Project 2E-ASD, including an experimental design, to develop evidence-based teaching and support strategies related to

identifying talent and developing advanced academic potential in students with academic talents and ASD. The overall premise of Project 2E-ASD is that these high potential students will be more likely to demonstrate academic success if well-designed research can identify evidence-based instructional and support strategies that can be implemented in conjunction with talent development and enrichment strategies by either their teachers or students. If educators can understand and learn how to identify, teach, enrich, and support these students, we can help their teachers increase their use of this evidence-based instruction through professional development (PD) and access to resources. In Year 1, 2019-2020, we will study successful college students who are 2E-ASD and the college programs in which they participate by gathering data from students with ASD who participate in them and from college program directors and staff. In Year 2, 2020-2021, we will work with professionals in approximately 20 public and private, non-profit schools in New England to identify approximately 50 academically talented high school sophomores and juniors with ASD who have a high probability for college success based on the data identified in Year 1. We will learn more about the characteristics of these students and identification procedures during this intensive process. We will also study the academic experiences and transition plans of these students, and the successful instructional and support strategies used by approximately 200 of their high school content area and special education teachers and compare these results to the successful college strategies identified in Year 1. In the spring following that academic year (spring of 2021), we will randomly select 25 of these 50 identified 2E-ASD to participate in the University of Connecticut 2-week residential summer pre-college program (UCRSP) in 2021 (the treatment group). We will also recruit up to 10 of their effective high school content area and special education teachers to work in this program. The UCRSP program has not previously enrolled students with ASD and has agreed to work

with us on our 2E-ASD Project, given that we provide additional support. We will teach the previously identified academic strategies, as well as integrate talent development and enrichment strategies, directly with students on the weekend before and during two afternoons and evenings of each week they are enrolled in UCRSP (<https://precollege-summer.uconn.edu>). The students will participate in two academic courses with other non-ASD students for two weeks, and the Project 2E-ASD students will also be given daily ongoing scaffolded support in the UCRSP with our 2E-ASD Support. In the third (2021-2022) and fourth (2022-2023) years following the UCRSP, we will compare the effects of that program participation on students' academic success and transition to college, using our control group (the other 25 2E-ASD students not randomly selected to participate in the UCRSP). We will provide individual reports on what was learned in the summer program to teachers of students in the treatment group. Although control group students will not participate in the UCRSP, we will prepare materials about successful strategies to use in college that will be given to all control and treatment students, their teachers, and their parents in the last year of the project. We will also continue to work on developing valid procedures for identifying students who are 2E-ASD. During 2022 (fourth year), we will, working with 10 participating high school teachers of treatment group students who have been identified as successful in teaching this group of 2E-ASD students, begin the development a professional development module that will be provided to teachers in the control group, These teachers will contribute to the development of this module, which will focus on the research-based academic, personal, and talent development strategies important for students' academic success as well as emerging research findings about procedures to identify these students. We will continue to finalize that professional development module during the remainder of year 4 (2022-2023), and subsequently provide that professional development module to the

approximately 100 teachers of students in the control group in the spring of year 4 (2023). We will also prepare materials for students and parents of students in the control group about strategies to use to achieve academic success in college, as all students will be of college age by the fifth year of the project. During years 3 and 4 (2021-2023), we will continue to track and monitor the academic process of students in both the treatment and control groups. We will also finalize our research-based identification process for students who are 2E-ASD. In Year 5 (2022-2023), we will continue to develop and disseminate a wide variety of project resources, including information about evidence-based learning strategies, a research-based identification system for student who are 2E-ASD, and a description of the evidence-based non-academic factors that enhance and restrict the transition to college for college-bound high school students with 2E-ASD. We will also prepare a 15-minute video, highlighting the results of our work, the most successful instructional strategies, and featuring 10 of our effective high school teachers.

Management of Objectives, Outcomes, and Products

The specific objectives and respective intended project outcomes are outlined in Table 1 as are descriptions of the activities to be completed under each objective, deadlines, persons responsible, and measurable outputs for each activity.

Table 1. Project 2E-ASD Objectives, Outcomes, Activities, and Deadlines

Objective/Activity	Deadline/Persons Responsible
<p>Objective 1: <i>To investigate and identify the behaviors and characteristics of students who are 2E-ASD that enable them to succeed in high school and college, and the attributes of college programs that contribute to their academic success.</i></p> <p>In Year 1 (2019-2020), the project will study successful students who are 2E-ASD and the college programs in which they participate by gathering data from students with ASD who</p>	

participate in them and from program directors and other staff. Academic learning and instructional strategies correlated with success, and those that serve as barriers, for first- and second-year students with ASD, will be identified.

Intended Outcomes:

- Provide research evidence about the characteristics and behaviors of high-potential and high-ability students with ASD, as demonstrated by 2E students who have been accepted and succeeded in college; prepare research monograph and article for scholarly journal.
- Identify the learning, instructional, and support strategies that are reported to correlate with success for students with ASD who have enrolled and been successful at various colleges and universities; prepare research monograph and article for scholarly journal.
- Identify colleges with successful disability programs for students with ASD and conduct focus groups of administrators and counselors in college disability programs to identify the strategies that contribute to academic success, as well as barriers to that success; prepare a research monograph, article for a scholarly journal, and an on-line module for educators summarizing the findings.

<p>Activity 1a. Explore the academic behaviors and characteristics of students who are 2E-ASD who are succeeding in college</p>	<p>Year 1: August 31, 2020/UConn research team in collaboration with university disability offices</p>
<p>Activity 1b. Identify instructional, study, and personal strategies used by 2E-ASD students who matriculate to college</p>	<p>Year 1: August 31, 2020/UConn research team</p>

<p>Activity 1c. Identify academic learning and instructional strategies correlated with successful college programs</p>	<p>Year 1: August 31, 2020/UConn research team</p>
<p>Objective 2: <i>To identify high school students who are 2E-ASD and the advanced-level high-end learning, study, interpersonal, and enrichment teaching strategies that enable these 2E-ASD students to succeed in high school and successfully transition to college.</i></p> <p>In Year 2 (2020-2021), we will work with professionals in public and private, non-profit schools in New England to identify approximately 50 academically talented high school sophomores and juniors with ASD who have a high probability for college success based on findings identified in Year 1. We will study the academic experiences and transition plans of these students, as conduct observations of instructional and support strategies used by a sample of 25% of their 200 high school content area and special education teachers. We will compare these to the successful college strategies identified in Year 1.</p> <p><i>Intended Outcomes:</i></p> <ul style="list-style-type: none"> • Study characteristics and behaviors of high potential/ability students with ASD and using these findings, identify methods to identify 50 sophomores and juniors in high school that meet these 2E-ASD criteria. • Using the results of Objective 1, study and identify the most frequently reported and observed instructional, study, and personal strategies used by teachers and students to help students succeed in high school and apply to college. • Identify whether talent development and enrichment strategies are used in the observed instructional, study, and personal strategies by teachers and students. 	

<ul style="list-style-type: none"> Write scholarly articles related to the academic experiences and transition plans of these students, and the instructional and support strategies used by their teachers. 	
<p>Activity 2a. Increase knowledge of high-potential behaviors and successful instructional, study, personal, enrichment and talent development strategies to achieve success in high school.</p>	<p>Year 2: January 31, 2021/ UConn research team in collaboration with high school teachers in up to 20 public and private, non-profit schools in New England</p>
<p>Activity 2b. Investigate teacher and 2E-ASD student use of instructional, study, and personal strategies that promote student academic and personal success in high school.</p>	<p>Year 2: May 15, 2021/UConn research team in collaboration with participating high school teachers and students</p>
<p>Activity 2c. Examine Individual Education Plans (IEPs) of high potential or 2E-ASD students for gifted identification and/or talent development/enrichment goals and the quality of comprehensiveness of transition plans for college listed on their IEPs.</p>	<p>Year 2: May 15, 2021/UConn research team in collaboration with participating high school teachers</p>
<p>Activity 2d. Investigate various methods of identification of high potential students with ASD that in diverse school settings.</p>	<p>Year 2: December 30, 2021/UConn research team</p>
<p>Objective 3: <i>To integrate the identified successful learning characteristics, instructional strategies, and talent development opportunities identified in previous research into a summer program to prepare 2E-ASD students for success in high school and transition to</i></p>	

college, and assess the outcomes of this program on students' academic success in treatment and control groups during the next two academic years.

During the summer of Year 2 (2021), a randomly selected group of up to 25 of the identified 2E-ASD students will be invited to participate in a 2-week UCRSP Program taught by professors at the University of Connecticut, during which our staff will explicitly teach the previously identified academic and enrichment strategies for up to 15 hours per week (available afternoons, evenings and weekends). We will invite up to 10 of the effective high school teachers of these students to support the students in this summer program. They will help us provide our students with enriched opportunities to learn to work collaboratively, enhance divergent and problem-solving skills, interact with each other and with professionals in their interest areas. We will also teach methods to acquire social skills and ease communication; assess strengths and interests, and create a strength and talent profile and plan for each student. We will support and monitor students, as they apply these skills to two academic courses, with ongoing scaffolded instruction to help them learn to succeed in a college class with non-ASD students. All 2E-ASD students will be tracked during their junior/senior years of high school and in college. College matriculation data, observation data, and student data (grades, college search behaviors, college acceptances, and measures of self-determination) will be collected for treatment and comparison groups. Students not randomly selected to participate in the UCRSP will serve as a control group. During years 3 and 4 (2021-2023), we will compare the academic process of students in both the treatment and control groups in high school and/or college. We will also continue work on our research-based identification process for students who are 2E-ASD.

Intended Outcomes:

<ul style="list-style-type: none"> • Development of a module that will be integrated into a 2-week residential summer program, that focuses on successful instructional strategies, personal and support strategies, and talent development strategies and enrichment. • Document whether and how students who are 2E-ASD learn to apply specific successful learning characteristics, personal, and instructional strategies and talent development strategies to the UCRSP courses. • Finalize the strategies and enrichment to prepare a program model or approach that can be used in other summer programs and begin dissemination; • Begin to develop a research-based identification process for students who are 2E-ASD 	
<p>Activity 3a. Promote student success by applying and directly teaching evidence-based instructional, study, and personal strategies identified in Project 2E-ASD to students in a summer program (treatment group).</p>	<p>Year 2: August 31, 2021/ UConn research team</p>
<p>Activity 3b. Compare student scores across the treatment (summer program) and control group (no program) on the following measures: grades, college search behaviors, college acceptances, and measures of self-determination.</p>	<p>Ongoing data collection across Years 3-4, 2021-2023/ UConn research team</p>
<p>Activity 3c. Investigate student retention in college for students who are entering college in the treatment group (summer program) as compared to the control group (no program).</p>	<p>Ongoing data collection across Years 3-4, 2021-2023/ UConn research team</p>

Objective 4: *To compare the effects of the professional development module on teachers' perceptions of and use of practices with 2e-ASD students*

During fall 2022 and spring 2023, we will develop a professional development module focusing on the most successful academic and non-academic as well as enrichment strategies important for students' academic success, as well as methods to develop talent development profiles and plans for students who are 2E-ASD. During spring 2023 of the project, we will provide that professional development module to the approximately 100 teachers of students in the control group.

Intended Outcomes:

- Develop a professional development module, with input and support from the identified effective high school teachers, to provide control group teachers with professional development in instructional, personal, and talent development strategies to the control group.
- Measure teachers' perceptions of 2E-ASD students and their use of practices before and after participation in the module (e.g. inclusion of talent development or enrichment goals in the IEPs, and the use of identified successful instructional strategies for this group)

<p>Activity 4a. Promote student success by developing an evidence-based professional development module including instructional, study, enrichment, and personal strategies identified in Project 2E-ASD.</p>	<p>Year 4: Spring 2023/ UConn research team, collaborating with high school teachers identified for their effectiveness in teaching this population</p>
<p>Activity 4b. Compare teachers' perceptions of 2E-ASD</p>	<p>Year 4: June 30, 2023/ UConn</p>

<p>students and their use of practices before and after participation in the module (e.g. inclusion of talent development or enrichment goals in the IEPs, and the use of identified successful instructional strategies for this group)</p>	<p>research team</p>
<p>Objective 5: <i>To develop and disseminate a wide variety of project resources.</i></p> <p>Expected outcomes include descriptions of evidence-based learning strategies, recommendations for identifying students who are 2E-ASD, and critical non-academic factors that promote academic success and that enhance or restrict the transition to college for high school students with 2E-ASD. Evidence about the success of summer programs will also be identified. Electronic and print-based training materials and professional development modules will be developed and disseminated widely. We will also develop, in collaboration with the most effective high school teachers in the project, a 15-minute video demonstrating the most effective instructional and support strategies for this population.</p> <p><i>Intended Outcomes:</i></p> <ul style="list-style-type: none"> • Complete, submit for publication, and disseminate project resources to both practitioners and researchers, including an article about characteristics of high ability students with ASD who are successful in school, an article about successful identification procedures and protocols for this population of 2E-ASD students. • Complete and submit for publication an article about successful instructional strategies and talent development strategies used by teachers and students based on evidence collected in this study. 	

<ul style="list-style-type: none"> • Disseminate resources such as strength-based instructional content, teacher training materials, and programs to help high ability students with ASD achieve academic success in high school and prepare for college. • Disseminate project results through conference presentations, as well as through a project website and the development of a 15-minute video, featuring the most effective and successful instructional and personal strategies for this population. 	
<p>Activity 5a. Develop and disseminate instructional resources from the project, with articulation of evidence-based instructional approaches teachers use for success and explanation of the types of high-potential behaviors of students with 2E-ASD.</p>	<p>Year 5: September 30, 2024/UConn research team</p>
<p>Activity 5b. Disseminate project activities and findings through presentations and journal publications for various audiences including researchers and practitioners.</p>	<p>Year 5: Ongoing- August 31, 2024/ UConn research team</p>
<p>Activity 5c. Disseminate project resources and findings to project participants, including characteristics of students who are 2E-ASD, effective teacher instructional strategies, identification methods, and relevant external audiences through a project website; produce a 15-minute video featuring the most effective and successful instructional and personal strategies.</p>	<p>Year 5: Ongoing- August 31, 2024/ UConn research team, effective teachers and UConn video team-</p>

Project Activities

Across the 5 years of Project 2E-ASD, we will identify 50 2E-ASD students, 25 of whom will participate in a summer program and 25 of whom will serve as a control group. We will also identify approximately 200 content area and special education high school teachers who teach our identified students. We will work with up to 20 public and private, non-profit high schools in New England, including those that serve large populations of students traditionally underserved in programs for the gifted, including students from economically disadvantaged backgrounds, those who are English learners, and those who live in rural areas (see Letters of Support in Other Attachments). We will identify students who are 2E-ASD in the schools with educators that have agreed to participate, with an understanding that they are volunteering to participate for all activities described in this proposal (interviews, completion of questionnaires, checklists, and logs, access to educational records, observations, and participation in trials of new teaching and support strategies over time). Educators will be able to participate if they have 2E-ASD students in their classrooms and are willing to participate in the activities discussed above, especially classroom observations of their instructional strategies with these students. The project will involve investigating, describing, and replicating successful instructional, personal, and support services for those who work with students with 2E-ASD, focusing on high school content area and special education teachers who teach these students. Both treatment and comparison teachers will receive all evidence-based instructional practices that focus on identification, enrichment and instructional strategies at the conclusion of the study. We will also offer the opportunity for all teachers working with the project team to provide insights into the behaviors that emerge during the implementation of these evidence-based strategies for identified 2E-ASD students. These observations will subsequently inform further revision of the

identification and instructional strategies.

Our focus is on helping high school content and special education teachers and integrating talent development and enrichment strategies into their instruction and support of these students. Talent development strategies for teachers may include the following educational experiences designed to align with students' strengths and interests: identification and nurturing strengths, interests and talents; using strengths to teach skill development; engaging students in understanding and making the curriculum more interesting; exposing students to exciting and engaging topics in which they may have interests; enabling students to conduct project-based learning; and the development of a talent profile and a talent plan for each student.

Research Design

Project 2E-ASD will be implemented with two types of interventions in two phases over the 5-year grant period. Table 1 highlights the project's major activities. Coordination of project activities will be managed through regular meetings of the UConn team and monthly or quarterly communication with the project consultant and evaluator. The project team will ensure regular communication efforts with school administrators as well as participating teachers. Project management will also include efforts to contact local private, non-profit schools and invite their participation. Private and public-school teachers can serve as research participants provided that their schools are able to meet the project expectations. In Table 2, the major activities and milestones of the project are linked to research questions, data collection and analysis, and instrumentation, which begins with the first year and continues throughout the project.

We have contacted several administrators from high poverty and private, non-profit schools as well as state department of education level administrators, and Directors of Special Education or Pupil Services to invite them to participate in Project 2E-ASD. Some have already

agreed to work with us to identify successful students and teachers of these students and submitted letters of support (See Other Attachments). We have and will continue to intentionally recruit from high poverty schools that serve large populations of students who are economically disadvantaged and culturally diverse (we already have support from two large urban school districts and one regional school district that encompasses several urban areas in Southeastern Connecticut), as well as well as private, non-profit schools. We will also work with state directors of Special Education and local high school administrators and Special Education Directors to recruit schools from major urban centers in New England. District administrators will have to agree to meet the expectations detailed in this proposal.

To participate in Project 2E-ASD, high school educators must agree to help us identify students who qualify as 2E-ASD and who are sophomores or juniors. Students and their parents/guardians must agree that students will be randomly assigned to the treatment group (requires attendance at a UConn Pre-college Summer Program) or control group (control teachers will receive professional development). Students must agree to participate in interviews and to complete forms about personal and learning strategies that help them succeed academically and socially in school. Content area and special education high school teachers of these students ($n = 200$) must agree to complete questionnaires and logs and be observed to enable researchers to identify instructional and support strategies for this population. Superintendents, principals, and special education directors must agree to support the study and work with us to schedule observations, IEP reviews, and random assignment of students to participate in the summer program. We will invite 10 of the most effective high school teachers to work with us in our summer program, and 10 others to contribute to the development of a professional development module of their successful strategies and how talent development and

enrichment strategies can be infused into instructional, learning, and support strategies. We will also invite 10 effective high school teachers to collaborate and develop a 15-minute video on exemplary practices for teaching 2E-ASD students.

In addition to the instructional materials, the project team will develop several instruments, described below, to support data collection, including surveys of teacher perceptions of high-potential behaviors in students with ASD, teacher reflection forms, observation forms for documentation of successful instructional strategies, and student assessment and talent plans documenting successful personal, learning and study strategies they can use.

Instrumentation

Teacher Perceptions of 2E-ASD Students Survey (TP2EASDSS). We will prepare and validate a survey of teacher perceptions of behaviors of high potential students who are 2E-ASD. The survey will draw from work previously completed by Renzulli, Smith, White, Callahan, Hartman, and Westberg (2002) and Brighton, Moon, Jarvis, and Hockett (2007). The survey will record teacher perceptions of behaviors of students identified as 2E-ASD before and after project activities and enable comparison between the treatment and comparison group. We will pilot the survey in Year 1, then administer it to participating teachers in Year 2 and Year 4.

Differentiated Instruction Classroom Observation Form (DICOFF). We will adapt a form, initially developed by Dr. Carol Tomlinson, to record the ways that high school content teachers adapt and differentiate their instruction to meet 2E-ASD students' unique differences. This observation form will enable us to measure teachers' use of various instructional, support, and enrichment activities, then to analyze changes in their teaching practices for this population over time. We will test the validity of this form to assess instructional practices; positive,

supportive learning environments; quality curriculum; preparation and response to learner needs, evidence of differentiation, and an analysis of the complexity of the lesson.

High School and College GPA, College Application, Matriculation, and Retention Form. We will develop a brief form to record high school and college grades, college application and matriculation information, number of credits earned, and college retention.

Teacher Strategy Documentation Log (TSDL). We will develop a log in which teachers of identified students with 2E-ASD will be asked to document their use of instructional strategies, personal support, and enrichment pedagogy used with these students. Documentation will include teachers' observations of the effectiveness of the strategies, as well as ideas for improvement, and notes on perceptions of student benefits from the instructional strategies.

Student Strategy Checklist (SSC). We will develop a Student Strategy checklist for participating students to record and reflect on their use of various strategies, (personal, study, self-regulatory, instructional, self-determination) that are helpful to their academic progress in school. The checklist should be completed 2 times each week to record strategies and once each week to explain one strategy used to help them successfully complete their work.

High School Success Scale for 2E-ASD (HSSS; pre/post). We will develop and pilot a new scale to be completed by teachers to measure students' skills with items adapted from the Social Skills Improvement System, the Self-Advocacy/Self Determination scales, the Learning and Study Strategy Inventory-High School Edition, and the Behavior Rating Inventory of Executive Function-Second Edition. We will administer this scale at the beginning and end of each academic year before and after the summer program while all participants remain high school to assess changes in the two groups in areas of social skills, self-advocacy, self-regulation, and executive function.

Total Talent Profile for 2E-ASD students (TTP). We will develop a Total Talent Profile with each student in the summer program to help them understand and document their interests, expression styles and preferred ways they like to work. Students can complete self-assessments in these areas and keep a record of their favorite activities and resources. We will include instruction about how to develop this TTP in the teacher professional development module developed for control group teachers, as well. The TTP can serve as an ongoing record to help students make decisions about future educational plans.

Individualized Talent Plan for 2E-ASD students (ITP). We will develop an ITP for each student attending the summer program and include directions for developing the plan in the teacher professional development module. This ITP focuses on student talents, with enrichment opportunities to explore, classes to take, future opportunities for independent studies and mentors, and participation in clubs, programs, competitions and contests.

The IEP Analysis Form. We will develop a brief form to be used when we review the IEPs of all identified 2E-ASD students for the presence of gifted identification, provision of either gifted or enrichment services, transition and college planning services, and post-secondary goals. A previously developed form based on Gelbar, Bruder, DeBiase, and Molteni (2018) will be used as a starting point for this measure.

Table 2. Objectives and Activities Linked to Research Questions, Methodology, and Instrumentation, Data Collection, and Analysis.

Objective/ Activity	Research Question(s)	Methodology/ Data Analysis	Instrumentation/Data Collection
1a-d	1. What are the behaviors and characteristics of students who are	Interviews & focus group	Researcher logs; Characteristics

	<p>2E-ASD who succeed academically in college?</p> <p>2. What are the characteristics of college programs in which 2E-ASD students can be successful?</p>	<p><u>Analysis:</u></p> <p>Inductive qualitative coding</p>	<p>documented from interviews</p>
2a-c	<p>1. What do the IEP's of students with 2E-ASD include?</p> <p>2. What instructional, personal, and support strategies are currently used by high school teachers to support and teach students who are 2E-ASD?</p> <p>3. How do educators recognize students who are 2E-ASD?</p>	<p>Surveys, record reviews, and interviews</p> <p><u>Analysis:</u></p> <p>Descriptive statistics and inductive qualitative coding</p>	<p><u>Instruments:</u> DICOF; TP2EASDSS; HSSS; TSDL; SSC; IEP Analysis Form</p>
3a-c	<p>1. Do 2E-ASD students who attend the UCRSP with 2E-ASD supports have better outcomes than the comparison group?</p>	<p>Randomized control trial</p> <p><u>Analysis:</u></p> <p>MANOVA</p>	<p><u>Instruments:</u></p> <p>TSDL; High School and College GPA, College Application, Matriculation, and Retention Form; DICOF; TTP; ITP</p>
4a-b	<p>1. Does teacher participation in the professional development module</p>	<p>One-group pre/post</p>	<p>Researcher notes, logs; Characteristics</p>

	<p>affect their perceptions of students who are 2E-ASD, the inclusion of talent development or enrichment goals in the IEPs, and the use of identified successful instructional strategies for this group?</p>	<p><u>Analysis:</u> t-tests</p>	<p>documented from interviews; <u>Instruments:</u> HSSS; IEP Analysis Form; TP2EASDSS</p>
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Project Evaluation and Feedback

This project will use a mixed methodology approach to evaluation that produces richer, more useful data. All methods employed address the overarching goal of tracking and measuring the projects’ efforts and the degree to which stakeholders are satisfied with project activities and materials. Dr. Reis (Co-Principal Investigator and Co-Project Director), Dr. Madaus (Co-Principal Investigator and Co-Project Director), and Dr. Gelbar (Senior Investigator) will meet regularly to monitor progress in implementing each center activity as outlined in Tables 1 and 3. This project has been designed with performance feedback and continuous improvement in mind from the outset.

Formative Evaluation

Dr. Susan Carroll will provide external evaluation services throughout the project. Qualitative techniques will include: surveys, in-depth interviews, focus groups, and/or observations to gather feedback from key stakeholders including, but not limited to, teachers, administrators, students, and project staff. Dr. Carroll will use multiple methods to ensure that the project is addressing stated objectives. Twice each year, Dr. Carroll will submit reports to the Co-PIs that may be used to improve project implementation (activities and management).

In addition, articles and technical reports produced for this project will be reviewed by

Table 3. Project 2E-ASD GANTT Chart

	Year 1			Year 2			Year 3			Year 4			Year 5	
	F	Sp	Sum	F	Sp	Sum	F	Sp	Sum	F	Sp	Sum	F	Sp
Identify successful 2E-ASD students in college	■													
Conduct focus groups with college staff	■	■												
Prepare research monographs and scholarly articles		■	■	■	■	■	■	■	■	■	■	■	■	■
Develop and pilot 2E Perceptions scale		■	■											
Recruit high school students and teachers		■	■	■										
Conduct teacher observations				■	■	■	■	■	■	■	■	■		
Survey and interview 2E-ASD students; review their IEPs				■	■				■	■	■			
Collect student data on treatment and control students					■	■	■	■	■	■	■			
Develop PreCollege Summer supports					■	■								
Treatment group students participate in PreCollege Summer						■								
Develop professional development module							■	■	■	■	■			
Provide professional development to teachers											■	■		
Develop and disseminate final project resources													■	■

journal editors (articles) and peer researchers, such as those associated with the National Center for Research on Gifted Education (technical reports). Dr. Carroll will also create stakeholder satisfaction surveys for various aspects of this project, with focused questions related to the participants' roles, probing their general satisfaction with the activity/product, their perceptions of whether their input was sought/valued during the process, the quality of the facilitators, and the quality of the project outcomes (such as the Summer Program). She will conduct focus groups, as needed, with open-ended qualitative questions to be included as appropriate. She will review products using similar criteria, and create a report aggregating these data and products, with suggestions for revision of project products and services based on continuous feedback.

Summative Evaluation

The research design allows for clear summative evaluation of whether the project achieved its intended outcomes. For example, a randomized control trial of 50 students identified as 2E-ASD is proposed for this study that meets the What Works Clearinghouse standards (NCEE, 2014) without reservation. G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) was utilized to conduct power analyses for a between two-group MANOVA. The following assumptions were utilized: a) $\alpha=0.05$, b) $\beta=0.2$, c) two groups, d) six response variables (pre and post-intervention), (e) the power analysis was set to analyze between subjects factors, and (f) Pillai $V=0.3$. The minimum sample size for this model to achieve statistical power was 40 participants. We are over-sampling by 25% (i.e., recruit 50 participants) to control for attrition.

This study will meet these guidelines because of the randomization and data analytic procedures as well as the efforts being taken to ensure baseline equivalence, treatment fidelity, and treatment. Randomization to the treatment (summer program) or comparison group (teacher PD) will occur at the student-level. Students will not be blocked within teachers or schools since

contamination is not a concern for this study as the summer program is a significant departure from typical special education practices. Rhoads (2011) found that contamination is not a significant concern in the design of education studies especially when the intervention deviates from typical education practice. To establish baseline equivalence, students will be randomized and data comparing the treatment and comparison groups will be analyzed. If the analysis reveals that the groups are not equivalent on the baseline outcome measures, students will be re-randomized. This process will continue until randomly assigned groups have baseline equivalence. To establish treatment fidelity, Dr. Carroll will observe the summer program and professional development modules to ensure they are being implemented consistently.

Preliminary Inclusion Criteria for Students who are Identified as 2E-ASD

To be considered for inclusion of the study, a student must have a score of over 120 on either the FSIQ or on two of the three cognitive indices (Verbal Comprehension, Fluid Reasoning, or Visual Spatial) of the WISC-5 (or other similar intelligence tests) and be receiving special education services under the Autism classification. Teachers will also have the ability to nominate students who have high potential with other special education classifications (e.g., emotional/behavioral disturbance) or students with a 504 plan if they have been diagnosed with ASD. Educational and medical records provided by the school will be reviewed for the nominated students, who will be considered for the study if it is determined that a previous evaluation has concluded that they met the diagnostic criteria for Autism Spectrum Disorder.

Working with the high school special education director and teachers who have identified students, we will review district assessments and selection of students who are 2E-ASD as well as review students' records to ensure that they meet the criteria for high potential/giftedness (based on grades, teacher nomination, background and history of aptitude and achievement

testing) to be identified as 2E-ASD and included in the study. The other inclusion criteria for all students in this study will include: parent consent, student assent, academic status as a student in 10th or 11th grade, a GPA in the top 25% of their high school class, at least 80% of time spent receiving instruction in the general education classroom, and all general education courses designated as college preparatory in nature. These inclusion criteria will be finalized as a result of the activities completed and research conducted during the first two years of the grant.

Quality of Project Services and Response to Application Requirements

Project 2E-ASD will enhance teachers' abilities to recognize and develop advanced academic success in this population of students. The focus of this project is on identifying students who are 2E-ASD, and conducting research about the academic and non-academic strategies necessary for academic success in high school and subsequently, in college. We also focus on the application of talent development and enrichment strategies to these instructional strategies, and the delivery of these skills to either students, teachers or both in residential summer programs or through the development of a Professional Development Module for teachers of these students. Thus, this project aims to *develop new information that assists schools in the identification of, and provision of services to, gifted and talented students (...including children with disabilities) who may not be identified and served through traditional assessment methods* (p. 7). We have intentionally included high poverty schools in which these students are traditionally underrepresented. We will also include private, non-profit high schools in this project. The context for Project 2E-ASD will be high school sophomore and junior classrooms and our focus is helping high school content teachers and students integrate talent development and enrichment strategies into their instruction of and support for these students. Talent development strategies for teachers include: educational experiences designed to align with

students' strengths, interests, and talents; identification and nurturing of strengths, interests and talents; using strengths to teach skill development; engagement of students in the curriculum using enrichment, exposure of students to exciting and engaging topics in which they may have interests, and enabling students to conduct some project-based learning.

Project 2E-ASD includes components of formative and summative evaluation, with quantitative and qualitative data from teachers and students to ensure feedback and continuous improvement in the project. The evaluation includes data collection and analysis by the project team as well as by an external evaluator who will monitor implementation of project objectives throughout the 5 years. Project 2E-ASD scales up aspects of existing models in gifted education designed to increase participation and performance of academically talented students with ASD.

Project Personnel: Senior Personnel

Dr. Sally Reis will serve as the Co-Principal Investigator and Co- Project Director. She is an Endowed and Board of Trustees Professor in Educational Psychology at the University of Connecticut. She will oversee the project, coordinating all activities in support of the project objectives and supervising the project team. She previously worked on several other Javits grants, including serving as a principal investigator for the SEM-R and the SEM-R in the Middle project (reading project, awarded 2008). She holds the Letitia Neag Morgan Chair of Educational Psychology and a Board of Trustees Professor in the Educational Psychology Department of the Neag School of Education at the University of Connecticut where she also served as Principal Investigator of the National Research Center on the Gifted and Talented (1990-2013). She has authored and co-authored more than 250 articles, books, book chapters, and monographs and technical reports. She is a past President of the National Association for Gifted Children and received the Distinguished Scholar and Service Award from that organization.

Dr. Joseph Madaus will serve as a Co-Principal Investigator and Co-Project Director on the project. He is the Associate Dean for Academic Affairs in the Neag School of Education. He is also Director of the Center on Postsecondary Education and Disability and is a Professor in the Department of Educational Psychology in the Special Education program. He coordinates the annual Postsecondary Disability Training Institute (www.pti.uconn.edu), which provides intensive professional development to over 300 college disability service professionals from across the United States and Canada. He was the Principal Investigator or Co-Principal Investigator on grants through the Office for Postsecondary Education, Office for Special Education Programs, the Institute of Education Sciences, and the State of Connecticut. He currently serves on the editorial board of nine journals, including the *Journal of Postsecondary Education and Disability*, *TEACHING Exceptional Children*, and *Career Development and Transition for Exceptional Individuals*. He was the co-editor of *Preparing Students with Disabilities for College: A Practical Guide for Transition*, published in 2018.

Dr. Nicholas Gelbar will serve as a Senior Investigator on the project. Dr. Gelbar is a tenure-track assistant professor at the University of Connecticut Health Center (School of Medicine) and the research director for the UConn University Center for Excellence in Developmental Disabilities. He earned his Ph.D. in Educational Psychology (with concentrations in School Psychology, Special Education, and Gifted/Talented Education) from the University of Connecticut in 2013. He is a licensed psychologist and has served as the internal evaluator for several OSEP-funded projects including the Early Childhood Personnel Center. His post-doctoral research has focused on the experiences of college students with disabilities, especially those with ASD, and he has authored two seminal publications in this area (Gelbar, Smith, & Reichow, 2014; Gelbar et al., 2015). In addition, he edited a book for Oxford

University Press entitled *Adolescents with Autism Spectrum Disorder: A Clinical Handbook*. Dr. Gelbar has authored 31 peer-reviewed articles and six book chapters.

Dr. Susan Baum will serve as a Senior Investigator. She is the Director of the 2e Center for Research and Professional Development at Bridges Academy, a school for twice exceptional students and is Provost of the Bridges Graduate School of Cognitive Diversity. She has several awards, including the 2010 recipient of the Life Time Achievement Award, the 2015 Distinguished Professional Alumni Award from the Neag School of Education, and the recipient of the Lifetime Achievement Award from the Association for the Education of Gifted Underachieving Students (AEGUS) and the *2e Newsletter* in 2017. A Professor Emeritus from The College of New Rochelle, Dr. Baum is widely published in the areas of differentiated instruction, twice-exceptional students, primary-aged gifted students, and social and emotional factors affecting gifted students. Dr. Baum is the past president and founder of the AEGUS.

Project Evaluator. Dr. Susan Carroll is a research methodologist with over 33 years of experience in program evaluation. She received her Ph.D. from the University of Connecticut in 1981. As president and founder of Words & Numbers Research, Inc., Dr. Carroll has conducted hundreds of program evaluations. She has evaluated many national, multi-year projects in the field of education, funded by the U.S. Department of Education and the National Science Foundation. She will serve as the external evaluator and will survey stakeholders, conduct observations and interviews, and review other project data, providing objectivity in the interpretation of results.