Gifted Child Quarterly
2022, Vol. 66(4) 266–276

DOI: 10.1177/00169862211061876
journals.sagepub.com/home/gcq
SAGE

A Systematic Review of the Research on Gifted Individuals With Autism Spectrum Disorder

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Abstract

This article includes a current research synthesis on a subpopulation of twice exceptional individuals, those who are academically talented with autism spectrum disorder (ASD). This population is emerging as an increasing focus of research, as the numbers of individuals identified are increasing. A total of 32 articles were included using the study's inclusion criteria, and of these 32 articles, 62.5% presented data, whereas the remaining 37.5% were review or conceptual articles. This review of articles published between 1996 and 2019 suggests little research is being conducted on this population. Some of the research conducted recently involve case studies, others are correlational in nature, and most are descriptive, focusing on participants' characteristics and how they were identified. A wide range of definitions were utilized in the literature, and to date, no empirical research has been published about this population. Implications from the current research base and suggestions for future research are included.

Keywords

academically gifted, autism spectrum, systematic literature review, twice exceptional

Introduction

People with autism spectrum disorder (ASD) may demonstrate advanced cognitive abilities and remarkable academic gifts (Charman et al., 2011) and are often referred to as 2e, an umbrella term for individuals identified as both gifted and having one or more disabilities (Reis et al., 2014). Understanding this population is particularly important given its noticeable growth in the past 20 years. The U.S. Department of Education, National Center for Education Statistics reported that the percentage of total public school enrollment that represents children served by federally supported special education programs remained relatively constant since the early 2000s (Snyder et al., 2019). Although the percentage of special education students remained the same (13.7% in 2017–2018), an increase occurred from 2010–2011 (417,000) to 2017–2018 (710,000) in students receiving support for ASD (Snyder et al., 2019).

Previous research suggests that 2e individuals with ASD may not be receiving the appropriate educational support needed to maximize their full cognitive potential and, accordingly, succeed at levels appropriate with their high potential in school (Cain et al., 2019). It is widely accepted that high abilities and talents can be manifested in numerous disciplines and across a variety of contexts, leading to a diverse range of definitions conceived by scholars and experts in multiple fields (Gagné, 2004; Renzulli, 1978/2011; Renzulli, 2012; Rose, 2013; Subotnik et al., 2011). Given these challenges, these and other experts generally recommend the use of multiple criteria to identify giftedness and talent, especially in diverse populations.

Defining 2e-ASD

The term "giftedness" has intentionally been avoided in some articles reviewed in this analysis due to conceptual disagreements (Boschi et al., 2016). Furthermore, as a variety of definitions of giftedness exist, each State Education Agency (SEA) and Local Education Agency (LEA) operationalizes giftedness with varying levels of similarities across conceptions (Cain et al., 2019; Renzulli, 2012). Some SEAs use a specific cutoff score calculated from an intelligence quotient (IQ) assessment or an achievement test, while others also include nontraditional domains such as artistic or leadership abilities (McClain & Pfeiffer, 2012; National Association for Gifted Children, 2015). Most

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scholars and researchers, however, agree that giftedness incorporates high abilities, noncognitive characteristics such as creativity, and the ability to focus and apply one's aptitudes to domains or areas of interest and potential (Dai, 2010; Renzulli & Reis, 2021; Sternberg & Ambrose, 2021; Subotnik et al., 2011, 2012). Scholars who have conceived research-based conceptions of giftedness also concur on the developmental nature of giftedness, as well as on the need for multiple criteria to identify a more diverse population with gifts and talents (Dai, 2010; Renzulli & Reis, 2021; Sternberg & Ambrose, 2021; Subotnik et al., 2011, 2012).

Complexities exist in defining giftedness and diagnosing ASD; therefore, estimates of prevalence of either should be interpreted with caution (Cain et al., 2019). This challenge increases the difficulty of identifying 2e individuals with ASD (McCoach et al., 2001; Ruban & Reis, 2005). Individuals who are both gifted and have ASD and who likely require unique educational accommodations or modifications may not be receiving critically important services because their ASD symptoms may be masked or mediated by their intelligence level (e.g., Assouline et al., 2009) and their giftedness may be masked by their ASD (Foley-Nicpon et al., 2017). Furthermore, the diagnostic criteria for ASD have changed over time and previous subtypes such as Asperger's syndrome are now encapsulated within the larger diagnosis of ASD (American Psychiatric Association [APA], 2013). The current diagnostic criteria for ASD require deficits in social communication and the presence of repetitive patterns of behavior or restricted interests (APA, 2013) and these difficulties in either domain can range from mild to extremely severe.

Appropriate Programming and Support

Challenges exist in both the fields of ASD and gifted education to promote a unified definition of 2eASD due to the heterogeneous nature of both categories (Rubenstein et al., 2015) as ASD and giftedness involve spectrums of abilities. Current research on this topic, however, lends support to the growing concern that 2e students are frequently offered inappropriate or inadequate educational support (Assouline et al., 2009; Huber, 2007). Although 2e individuals acquire commonly noted strengths such as superior vocabulary, problem-solving and reasoning skills, and creative abilities (e.g., Nielsen & Higgins, 2005), they continue to encounter difficulty performing at their full cognitive capacity and potential in mainstream settings due to challenges in executive functioning, expressive language, attention and focus, and physical production of schoolwork (Cain et al., 2019). For instance, advanced rote skills may be mistaken for advanced comprehension (Huber, 2007). On the contrary, the advanced comprehension and creative thinking of a gifted student may also be overlooked because of weaker learning strategies (Burger-Veltmeijer et al., 2011). Gifted students with ASD require heightened academic challenge, as research shows that participating in gifted programming positively correlates with academic achievement in math, reading, and oral language (Assouline et al., 2012). This is important to consider because some students with ASD can respond very negatively (e.g., tantrums or refusals) when asked to repeat a task in which they had already shown mastery (Rubenstein et al., 2015). On the contrary, variations in presentation among individuals with ASD can make it challenging to recommend specific educational adaptations for this population (Rubenstein et al., 2013).

Supporting Gifted Students With ASD in the Classroom

Research-based educational strategies for working with this specific population are scarce; however, some research mentions realistic and concrete ways to support this group (Bianco et al., 2009). An example of supporting gifted students with ASD in the classroom includes utilizing dually differentiated curriculum, such as programming that considers the full range of students' abilities and limitations (Bianco et al., 2009). According to Baum et al. (2001), dual differentiation is described as "meeting the needs of students who exhibit two contradictory sets of learning characteristics by creating a balance between nurturing strengths and compensating for learning deficits" (p. 481). Furthermore, using the interests and passions of gifted students with ASD to develop interdisciplinary thematic units creates additional opportunities to teach academic and social skills while simultaneously broadening their area of interest (Bianco et al., 2009). Students with ASD reported they wanted their teachers to incorporate their interests into the curriculum (Winter-Messiers, 2007).

Purpose of the Study

Systematic reviews enable researchers and scholars to summarize what is known about a topic to inform those in clinical practice and provide direction for future research endeavors. It is necessary to conduct these types of reviews periodically to review and understand the latest research on a given topic. The other prior systematic review we found on this topic (Burger-Veltmeijer et al., 2011) identified 25 articles that met specific inclusion criteria, generally focused on diagnostic issues concerning 2e students with ASD. The authors of that review noted that different definitions were used across the literature to conceptualize 2e students with ASD. It is important to note that this previous analysis included literature reviews, conceptual pieces, and book reviews. The purpose of the current review, focusing on both diagnostic issues and research methodologies, is to provide an updated synthesis of published research as 2e students with ASD are emerging as an increasing area of concern and interest in school settings and in the research literature (Rubenstein et al., 2013).

Method

A systematic review of research related to academically advanced individuals with ASD was conducted using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher et al., 2009) and Maggin et al.'s (2017) "Quality Indicators for Systematic Reviews in Behavior Disorders." These sources provided guidance on best practices for conducting systematic reviews and were used to direct the process of conducting this analysis.

Defining Terms

As noted, consensus does not exist regarding how to best define giftedness because multiple research-based definitions have been proposed previously (McBee & Makel, 2019). For the purposes of this review, we operationalized giftedness as demonstrating superior intellectual potential (as indicated by high full-scale IQ, verbal, or nonverbal scores) or superior academic achievement scores (actualized potential) in a broad academic domain (e.g., reading, mathematics, or writing). This operationalization of giftedness aligns with the latest definition of twice exceptionality from Reis and colleagues (2014). Cutoff scores defining superior performance were not determined a priori to enable the researchers to synthesize the scores used in previous research to define academic potentials and talents in individuals with ASD. It is important to note that we defined academic talent as requiring skills across broad academic domains, as many individuals with ASD have restricted interests (Richler et al., 2010) and may develop overly specialized knowledge in a specific area that does not necessarily translate to superior academic performance. We also focused on academic talents and not artistic, leadership, or athletic talents as academic talents are the skills that better predict participation and success in higher education. Furthermore, savant skills (e.g., naming the day of week for any date) were not considered as evidence of academic talent as previous research (Dubischar-Krivec et al., 2009) has noted that these skills are based on algorithms and do not translate to academic performance.

For the purpose of this review, ASD was defined as meeting the contemporary diagnostic criteria at the time that the article was published; thus, research using both the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association [APA], 1994) and *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; APA, 2013) diagnostic criteria were included. Unlike other definitions of twice exceptional, we used clinical symptomology as an indicator of disability and did not require the presence of Individual Education Programs (IEPs) or Section 504 accommodations. In other words, our review focused solely on whether an individual met the diagnostic criteria for ASD or the criteria for educational classification of ASD. Individuals with ASD may or may not qualify for special education services or Section 504 plans depending on their educational needs, so this review used a slightly broader framework than that outlined by Reis and colleagues (2014). Furthermore, while the definition and conceptualization of 2e have been focused on the U.S. education system, using this broader framework allowed us to include articles published internationally.

Inclusion and Exclusion Criteria

We developed inclusion and exclusion criteria prior to conducting systematic searches for articles. Articles were included if they were published in English in a peer-reviewed journal prior to December 31, 2019. Editorials and book reviews were excluded. To be included, the population studied in each research article had to be individuals who were diagnosed with ASD (as reported by the articles' authors) with demonstrated talent in an academic domain or academic potential (evidenced by intellectual ability scores, as defined in the previous section). Articles in which the authors did not clearly indicate that individuals had a medical diagnosis of ASD were excluded. Articles solely about individuals with savant skills or circumscribed interests were excluded from this review. Articles reporting only on college students with ASD were also excluded from this review, unless it was demonstrated that the entire sample met the definition of academic talent utilized to guide this study. There were no requirements regarding the age of participants or the age of the studies included in this review as we sought to summarize all of the available research on the topic.

Search Terms and Process

To conduct this systematic review, the following Boolean search terms were entered in the ERIC, Academic Search Premier, PsycInfo, and Medline databases: (gifted or talented or "high-achieving" or eminent or "high-ability") AND (exp child development disorders, pervasive OR autis* OR pervasive development* disorder* OR PDD or PDDs OR Asperger*). The first set of search terms was adapted from Rinn and Bishop's (2015) systematic review of gifted adults. The second set of search terms was adapted from Gelbar et al.'s (2014) systematic review of college students with ASD.

The search terms were entered into the databases on two occasions. All articles published before December 31, 2018, were gathered on January 13, 2019, and all articles published during 2019 were gathered on January 8, 2020. After the articles were gathered, duplicates, book reviews, and editorials were removed. A two-stage review process was then conducted. In the first stage, the title and abstracts of the articles were reviewed by the first two members of the research team to determine whether they met the inclusion criteria. If at least one coder indicated the article met the inclusion criteria, it was included in the second stage full-text review.

The citation lists of the articles included in the full-text review were then examined to determine whether any additional articles should be analyzed by the team. Any articles that were not previously found were included in the full-text review stage. During this stage, the full text of the article was reviewed by two members of the research team to determine whether it met the study's inclusion criteria. The members met to discuss any disagreements, which were resolved by consensus. The remaining articles after the full-text review were analyzed for themes based on the research methodologies used.

Results

The PRISMA diagram (see Figure 1) summarizes information regarding the number of articles analyzed at each stage of the systematic review process, including how many articles met the study's inclusion criteria. The Boolean search yielded 134 articles. The reference lists of the articles included in the full-text review yielded an additional nine articles, whose full-text were also reviewed to determine whether they met the study's inclusion criteria. A total of 32 articles met the criteria, and of these 32 articles, 62.5% included data ($n = 20$) and 37.5% were review or conceptual articles ($n = 12$) that did not include data.

Research Methodology Used

Of the 20 articles that included data, 11 presented case studies depicting individuals who were gifted and also met the diagnostic criteria for ASD. Eight articles utilized correlational research methods with larger samples to explore the relationships between gifted traits and ASD symptomology. One article utilized a phenomenological (qualitative) methodology to analyze 11 interviews with parents of children who were gifted with ASD, with findings indicating that parents struggled to find the appropriate educational placements for their children (Rubenstein et al., 2015).

Giftedness Operationalized

Of the 20 studies that presented data, 15 clearly operationalized giftedness as shown in Table 1. The remaining five articles utilized qualitative case studies and did not consistently use quantitative cutoffs to define giftedness (Assouline et al., 2009; Barber, 1996; Baron-Cohen et al., 1999; Boucher, 2007; Weidenheim et al., 2012). They utilized a more holistic approach, such as attaining education/professional status (Baron-Cohen et al., 1999; Weidenheim et al., 2012), a history of acceleration in academic subjects (Barber, 1996), or qualitative descriptions of the participants' intelligence (Assouline et al., 2009; Boucher, 2007). It is important to note that the gifted individual in Assouline and colleagues'(2009) study had a General Ability Index score on the Wechsler Intelligence Scale for Children–Fourth Edition of 160.

All 15 articles specified quantitative cutoffs except one (Cain et al., 2019) and also included scores from standardized cognitive ability assessments in their definitions. Cain and colleagues (2019) only utilized information from standardized academic achievement assessments in their operationalization. Two of the publications defined giftedness using either standardized cognitive ability or academic achievement assessments (Foley-Nicpon et al., 2012; Rubenstein et al., 2015). Two other articles also allowed participation in a school's gifted and talented program as evidence of giftedness (Cain et al., 2019; Rubenstein et al., 2015). The preponderance of articles ($n = 6$) solely relied on full-scale intelligence quotient (FSIQ) to operationalize giftedness. The remainder utilized a definition that allowed the FSIQ or at least one index score to be above a cutoff to define giftedness. Each published study differed in terms of which index scores were utilized in their operationalization. Furthermore, nine of the articles utilized standard scores of at least 119 or 120 to define giftedness while the remainder required standard scores of at least 130.

Case Studies

The 11 case study articles included 20 cases of gifted individuals with ASD.[1] One article (Weidenheim et al., 2012) presented the results of an analysis of the brain of a gifted mathematician who was diagnosed with Asperger's syndrome and indicated that there were no neuroanatomic abnormalities. A recent article conducted an in-depth analysis of two-fifth graders who were gifted with ASD (Wu et al., 2019), using a success case methodology. The researchers found that a supportive school context, implementing curriculum flexibility and a strength-based approach, and also providing a safe environment were important to support the needs of students who are gifted and also have ASD.

The remainder of the case studies explored the interaction of giftedness and ASD traits. One article noted that psychological assessments of three gifted children with ASD did not systematically provide sufficient information regarding their strengths and were focused on their weaknesses (Burger-Veltmeijer et al., 2016). Only one article noted the presence of an intervention related to giftedness: acceleration (Barber, 1996). Four articles indicated cases that had discrepancies between their verbal and nonverbal intelligence (Melogno et al., 2015; Nass & Gutman, 1997; Stein et al., 2015; Ward & Alar, 2000). While all of the participants' cognitive scores in the previously discussed studies were in at least the above average range, either their verbal or nonverbal scores were in the superior range, which demonstrated their high academic potential.

Five of the case study articles noted that individuals with ASD had social skills difficulties that were significant and were clearly differentiated from any of the usual social difficulties that gifted individuals may display (Assouline et al., 2009; Barber, 1996; Nass & Gutman, 1997; Stein et al.,

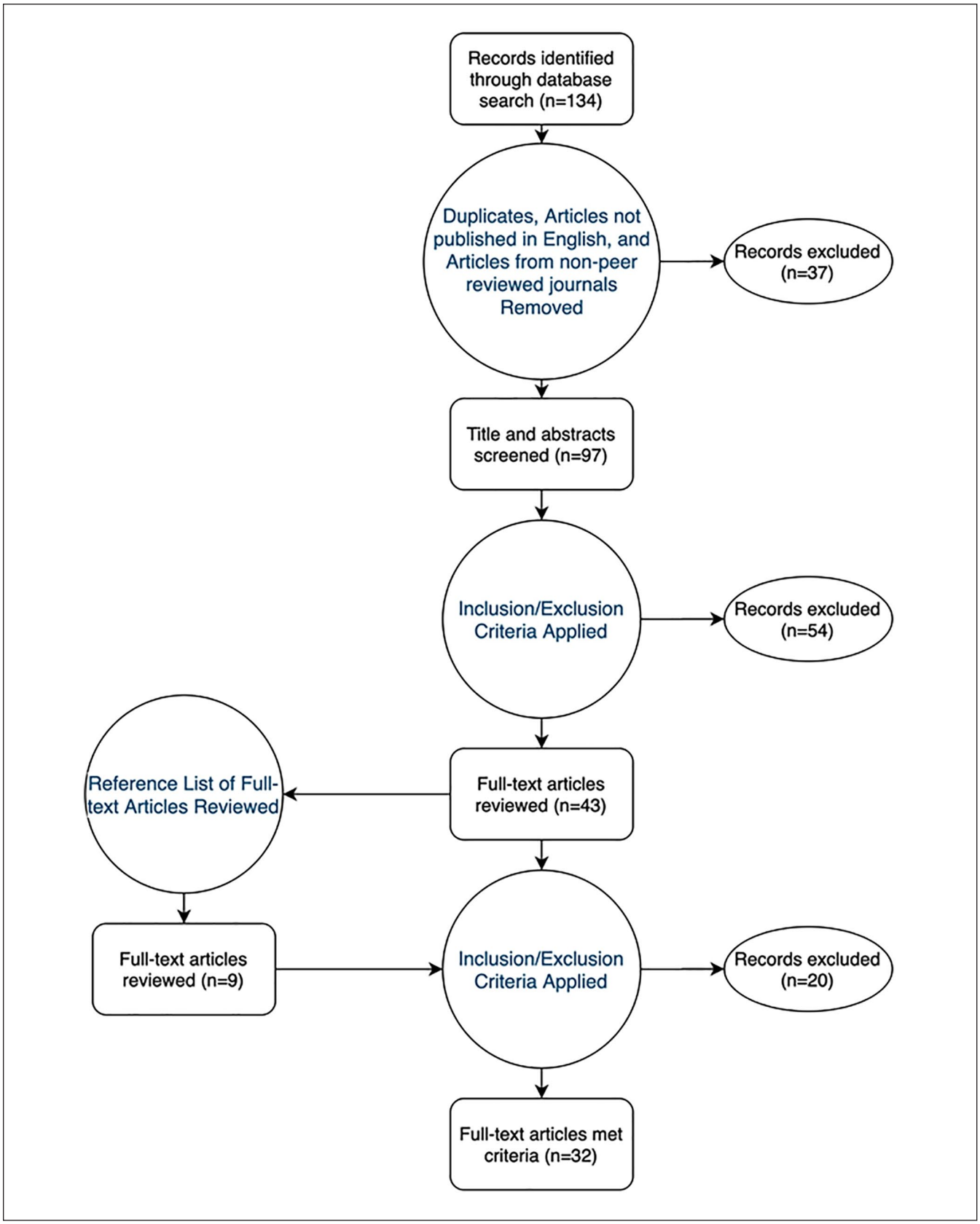

Figure 1. PRISMA Diagram.
Note. PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Table 1. Definitions of Gifted and ASD Used in Studies Included in This Review.

Citation	Location and sample size	Method	Gifted definition	ASD definition
Assouline et al. (2009)	Location: U.S. Sample size: 1	Case study	NA	*DSM-IV-TR* criteria confirmed by ADOS-2 and ADI-R scores
Assouline et al. (2012)	Location: U.S. Sample size: 59	Correlational	At least one index standard score of 120 or above on a standardized cognitive ability assessment	*DSM-IV-TR* criteria confirmed by ADOS-2 and ADI-R scores
Barber (1996)	Location: U.K. Sample size: 1	Case study	NA	*DSM-IV* criteria
Baron-Cohen et al. (1999)	Location: U.K Sample size: 3	Case study	NA	*DSM-IV* criteria
Burger-Veltmeijer et al. (2015)	Location: Netherlands Sample size: 36	Correlational	FSIQ of 130 or above on a standardized cognitive ability assessment	*DSM-5* criteria
Burger-Veltmeijer et al. (2016)	Location: Netherlands Sample size: Three dossiers of IG students with signals of the ASD-cluster *Inadequate reciprocal social interactions*	Case study	FSIQ of 130 or above on a standardized cognitive ability assessment	*DSM-5* criteria
Cain et al. (2019)	Location: U.S. Sample size: 696	Correlational	Scoring at or above the 90th percentile (standard score = 119) on any subtests of a standardized achievement test OR qualifying to participate in their school's gifted and talented program	Educational classification of ASD on IEP
Cederberg et al. (2018)	Location: U.S. Sample size: 23	Correlational	FSIQ of 120 or above on a standardized cognitive ability assessment	*DSM-IV-TR* or *DSM-5* criteria confirmed by ADOS-2 and ADI-R scores
Doobay et al. (2014)	Location: U.S. Sample size: 40	Correlational	Verbal intelligence or nonverbal intelligence standard score of 130 or above on a standardized cognitive ability assessment	*DSM-IV-TR* criteria
Foley-Nicpon et al. (2010)	Location: U.S. Sample size: 54	Correlational	FSIQ, verbal intelligence, or nonverbal intelligence standard score of 120 or above on a standardized cognitive ability assessment	*DSM-IV-TR* criteria confirmed by ADOS-2 and ADI-R scores
Foley-Nicpon et al. (2012)	Location: U.S. Sample size: 52	Correlational	At least one index standard score of 120 or above on a standardized cognitive ability and/or academic achievement assessment	*DSM-IV-TR* criteria confirmed by ADOS-2 and ADI-R scores
Foley-Nicpon et al. (2017)	Location: U.S. Sample size: 45	Correlational	At least one index standard score of 120 or above on a standardized cognitive ability assessment	*DSM-IV-TR* criteria confirmed by ADOS-2 and ADI-R scores[a]
Melogno et al. (2015)	Location: Italy Sample size: 1	Case study	FSIQ of 130 or above on a standardized cognitive ability assessment	*DSM-IV-TR* criteria
Nass and Gutman (1997)	Location: U.S. Sample size: 5	Case study	FSIQ of 120 or above on a standardized cognitive ability assessment	*DSM-IV* criteria
Stein et al. (2015)	Location: U.S. Sample size: 13 parents	Qualitative	At least 90th percentile (standard score of 119) on at least one index of on a standardized cognitive ability and/or academic achievement assessment OR qualifying to participate in their school's gifted and talented program	*DSM-IV-TR* or *DSM-5* criteria
Stein et al. (2015)	Location: U.S. Sample size: 1	Case study	FSIQ of 130 or above on a standardized cognitive ability assessment	Unclear
Ward and Alar (2000)	Location: U.S. Sample size: 1	Case study	Nonverbal intelligence index of 130 or above on a standardized cognitive ability assessment	*DSM-III* criteria
Weidenheim et al. (2012)	Location: U.S. Sample size: 1	Case study	NA	*DSM-IV-TR* criteria
Wu et al. (2019)	Location: U.S. Sample size: 2	Case study	FSIQ, verbal intelligence, or nonverbal intelligence standard score of 120 or above on a standardized cognitive ability assessment	Educational classification of ASD on IEP or *DSM-5* criteria

Note. ASD = autism spectrum disorder; *DSM-IV-TR* = *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev); IG = intellectually gifted; ADOS-2 = Autism Diagnostic Observation Schedule-2; ADI-R = Autism Diagnostic Interview–Revised; IEP = Individual Education Program; *DSM-IV* = *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.); FSIQ = full-scale intelligence quotient; *DSM-5* = *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.).

[a]The participants had to be diagnosed using *DSM-IV-TR* criteria, but the study looked at whether they would meet the criteria for the *DSM-5* criteria.

2015; Ward & Alar, 2000). Difficulties with pragmatic language were noted in two articles (Melogno et al., 2015; Stein et al., 2015) and two articles also noted difficulties with theory of mind (Baron-Cohen et al., 1999). Difficulties with executive function were noted in two articles (Assouline et al., 2009; Boucher, 2007). The presence of challenging behaviors was noted in one article (Ward & Alar, 2000) and one article noted that difficulties acquiring adaptive skills were present (Assouline et al., 2009).

Correlational Research

None of the correlational studies focused on educational outcomes or experiences. Of the eight correlational articles, three indicated that giftedness may mask the detection of ASD symptomology (Burger-Veltmeijer et al., 2015; Cederberg et al., 2018; Foley-Nicpon et al., 2017). One article noted that gifted individuals with ASD scored lower on ASD screening measures than the general population of individuals with ASD (Cederberg et al., 2018). Another noted that the Autism Diagnostic Observation Schedule (ADOS) may not be sufficient to diagnose ASD in gifted individuals (Foley-Nicpon et al, 2017), but noted that when the ADOS is combined with the Autism Diagnostic Interview–Revised (ADI-R) to obtain a comprehensive developmental history, it was possible for individuals to continue to meet the diagnostic criteria for ASD.

The other five correlational articles explored the performance of gifted ASD individuals on various psychological measures. One article compared gifted individuals with ASD with gifted individuals without psychological diagnoses (Doobay et al., 2014) and found that gifted individuals with ASD had processing speed weaknesses. Another article found that processing speed predicted the academic achievement of gifted individuals with ASD over and above the other cognitive factors (Assouline et al., 2012). A similar article compared high-functioning individuals with ASD with individuals diagnosed with Asperger's syndrome, finding that individuals with Asperger's syndrome had higher verbal IQ scores (Foley-Nicpon et al., 2012).[2] Individuals with high-functioning ASD performed better at math fluency and written expression tasks. Another study looked at the longitudinal trajectory of gifted students with ASD and found that these students had higher academic achievement scores relative to students with ASD who were not identified as gifted (Cain et al., 2019). Cain and colleagues also found that the trajectory of gifted students with ASD's academic achievement scores improved over time relative to the non-identified individuals with ASD and the general population, with the exception of their performance on Letter-Word Matching of the Woodcock-Johnson Tests of Educational Achievement–Third Edition (Mather & Wendling, 2014).

Doobay and colleagues (2014) found that gifted individuals with ASD had weaknesses in developing adaptive skills and with general psychological functioning, distinguishing them from gifted individuals without an ASD diagnosis. These difficulties with adaptive skills and general psychological functioning for gifted individuals with ASD were also noted in a previous study (Foley-Nicpon et al., 2010). Interestingly, Foley-Nicpon et al. (2010) also found that gifted individuals with ASD did not self-report these difficulties, indicating their weaknesses in self-knowledge.

Discussion

The results of this study indicate a paucity of research regarding twice exceptional individuals with ASD. Only 20 articles presenting data were published through 2019 on this topic with no empirical investigations regarding interventions. The research that does exist is largely descriptive in nature, suggesting that academically talented individuals with ASD have been identified, with other preliminary evidence suggesting which screening and diagnostic measures can differentiate gifted individuals from gifted individuals with ASD. The body of existing research also indicates that difficulties faced by the larger population of individuals with ASD include executive function struggles, as well as the development of adaptive skills experienced by 2e individuals with ASD.

One of the challenges of synthesizing this literature is the varying definitions of giftedness utilized across studies, similar to the findings of Burger-Veltmeijer and colleagues (2011). Most definitions focused on cognitive ability, as compared with academic achievement, and focused on potentiality versus actualized talents. Furthermore, most definitions did not focus solely on FSIQ, but required that at least one cognitive index score be above a cutoff. This enabled a wider range of students to be included in the samples. This de-emphasis on FSIQ was noted in several studies; individuals with ASD are known to demonstrate weaker processing speed compared with individuals without ASD, which can depress the FSIQ score (Assouline et al., 2009; Calhoun & Mayes, 2005; Doobay et al., 2014; Foley-Nicpon et al. 2012, 2017; Mayes & Calhoun, 2007, 2008; Oliveras-Rentas et al., 2012). While a range of definitions of giftedness/academic talent were utilized in these studies, we suggest that future research use the Foley-Nicpon et al. (2012) standard as the best practice for identification of this population (i.e., at least one index standard score of 120 or above on a standardized cognitive ability and/or academic achievement assessment), as it casts the widest net and includes both potentiality and actual academic achievement as indicators.

Limitations and Directions for Future Research

This systematic review employed best available practices, but several limitations should be noted. First, while we made every effort to gather the full corpus of literature published on this topic, a possibility exists that the way electronic

databases are indexed may have biased the Boolean search. We reviewed the reference lists of all articles in the full-text review phase to mitigate this possibility. As the research on this topic has been published in a range of journals, we chose not to conduct hand searches of specific journals, which may have biased the results. Future research should include hand searches to avoid this limitation. Second, this systematic review did not include unpublished literature, such as doctoral dissertations. Because the quality of research presented in that body of literature (e.g., doctoral dissertations) varies as it is not peer-reviewed, we decided to not include this information. Future systematic reviews on this topic should consider including information from these and other sources.

The limited published research base on 2e students with ASD suggests many potential opportunities exist to conduct research on this population. More information is needed regarding the functional needs of this population, including their social, adaptive, and executive function skills. In addition to understanding the specific challenges faced by these individuals, it will be important to also explore various interventions that work effectively to improve academic achievement and outcomes in life. It also will be important to consider whether existing interventions for gifted or students with ASD can be tailored or differentiated to meet the needs of this group in the future. Furthermore, as these individuals have the potential to attend competitive colleges and work in professional jobs, it will be important to assess a wider range of these skills as many current measures of adaptive skills and social skills have been developed for individuals with intellectual disabilities and/or individuals who are not academically talented. In other words, current measures do not focus on the social and adaptive skills required to attend college or participate in the professional workforce. In addition, future research should investigate the use of relevant gifted education pedagogy, such as acceleration, enrichment, and differentiated instruction and curriculum to assist and help these young people develop their gifts and talents in a way that enables them to have a meaningful and successful academic experience in their elementary, secondary, and college years.

Recommendations

Research on this population is important as educators begin to identify more academically talented students with ASD and as an understanding emerges that some of these young people have been able to use their abilities to hide their disabilities. We also need to understand which specific types of educational interventions will help develop these students' talents and which special education and gifted education instructional strategies may enable them to address their disabilities and develop their abilities. With the limited existing research base, many opportunities are available for researchers, scholars, and educators to develop educational strategies that both address the unique needs of this population and can be implemented by educators who care about meeting the unique needs of this group of 2e students.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The research was funded by the U.S. Department of Education, Javits Gifted and Talented Students Education Grant Program (Grant Number: S206A190023). Materials and opinions expressed herein do not necessarily represent the Department of Education's position or policy.

Open Science Disclosure Statement

No newly collected data were analyzed in this study for purposes of reproducing the results. The protocol used to generate the findings reported in the article is not available for purposes of reproducing the results or replicating the study. There were no newly created, unique materials used to conduct this research.

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Notes

1. One case study compared a gifted girl with a gifted girl with autism spectrum disorder (ASD; Assouline et al., 2009). The child without ASD is not included in the number of cases.
2. Although the current nosology (American Psychiatric Association, 2013) does not differentiate subtypes of ASD, previous research did compare subtypes that led to their removal from the current nosology.

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Manuscript received: December 28, 2020; Final revision received: October 19, 2021; Accepted: November 3, 2021.