College Students Who Have ASD: Factors Related to First Year Performance

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Abstract

College attendance is increasing for students who have an autism spectrum disorder (ASD), yet a dearth of literature exists about their progress in postsecondary education. This study describes a group of college students who have the formal diagnosis of an ASD to uncover factors related to their academic performance. Twenty-three first-year college students who have the diagnosis of ASD were tracked for two contiguous semesters to determine if anxiety and executive function are related to end-of-year grade point average (GPA). A significant positive correlation between the BRIEF-A composite index of behavioral regulation and GPA was found. Study participants reported no or mild levels of anxiety, and six reported clinically significant ADHD symptoms. Twenty-two of 23 members of the study remained enrolled for full two semesters, suggesting a successful transition to college. Implications for postsecondary services are discussed.

Keywords: Autism spectrum disorders, postsecondary performance, executive function, anxiety, ADHD

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition that affects 1.4% of the national population, a number that has increased by 120% since 2002 (Centers for Disease Control, 2014). Despite increasing diagnoses and growing national awareness of ASD, research on postsecondary experience students with ASD is limited (Gelbar, Smith, & Reichow, 2014). College-bound, intellectually able students with ASD may have distinctive needs, and research that will inform effective support models, particularly in academics, is still needed (Zeedyk, Tipton, & Blacher, 2016). The purpose of this study is to contribute to the understanding of the needs of first-year college students with ASD by describing 23 students and examining whether co-occurring anxiety and executive function are linked to their academic success.

ASD is a heterogeneous condition, varying substantially in severity and manifestation of symptoms. Social difficulties, impaired communication, and restricted, repetitive behavior are the diagnostic center of ASD (American Psychiatric Association, 2013). While research efforts often focus on children, ASD continues in adulthood affecting the social relationships, education, employment, and quality of life (Pinder-Amaker, 2014). A prevalence study estimated that 0.7 to 1.9% of enrolled students met the diagnostic criteria for ASD, although many were undiagnosed (White, Ollendick, & Bray, 2011).

Postsecondary Students Who Have ASD

Postsecondary education is recognized as a key to success in adult life, and the 46% upsurge in enrollment in degree-granting postsecondary institutions since 2000 demonstrates this trend (U.S. Department of Education, 2015a). Having a postsecondary degree is associated with higher lifetime income, lower unemployment, and better health (Sanford et al., 2011). For students with ASD, the benefits also include improved self-esteem, access to a valued social role, and greater community involvement (Hart, Grigal, & Weir, 2010). Despite the advantages conferred by postsecondary education, degree attainment by students with disabilities continues to be lower than the

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general population, (Sanford et al., 2011; U.S. Dept. of Education, 2015b).

While most high school students with ASD expect to continue their education, (Anderson, McDonald, Edsall, Smith, & Taylor, 2016), their expectations may not be met. After high school, 57% of individuals with ASD were found to be focused on postsecondary education and 14% on employment, while 29% were found to be "continuously or increasingly disengaged," (Wei, Wagner, Hudson, & Shattuck, 2015). Of 11 disability categories, autism is third lowest in college enrollment and graduation (Sanford et al., 2011). Many typical students who have ASD traits, particularly in pragmatic language, have shown difficulty adapting to college (Trevisan, & Birmingham, 2015).

Research has begun to illuminate the barriers to college success for students with ASD and to identify practices that work for this group; however this area of inquiry is not yet robust. Nicholas W. Gelbar and colleagues (2014) conducted a systematic review of published studies from 1999-2013 and found 20 articles describing the collegiate experiences and supports of adults with ASD. "Overall the major finding of this review is the scarcity of research concerning the experiences of college students with ASD … It is time to move past theoretical suggestions and into empirically-based recommendations" (p. 2599).

To date, the majority of research on postsecondary students with ASD is descriptive and interview-based. Students who have ASD have described the challenges and positive aspects of their collegiate experience, echoing themes that also come up in empirical literature. Students report that feelings of anxiety, depression, and loneliness are prominent in their college experience, as are difficulties managing workload, time, sensory input, and new social demands (Gelbar et al., 2014; Nirmal, 2014; Van Hees, Moyson, & Roeyers, 2015). College faculty members have observed similar challenges in their work with students who have diagnosed ASD (Gobbo & Shmulsky, 2014).

Beyond graduation and retention rates, little is known about the academic performance of college students with ASD, but one study of 35 students found strong academic performance. The average self-reported GPA was 3.27, with 80% reporting a GPA above 3.0, and 49% arriving with AP credits (Gelbar et al., 2014). Positive aspects of being in college include improved self-esteem, having a valued social role, and better future employment (Hart, et al, 2010). In addition, students report a "sense of appreciation" for college—that they like college and they enjoy the intellectual respect (Nirmal, 2014).

Anxiety

Anxiety is often a significant problem for individuals with ASD, and co-occurrence rates range from 40-84% and are positively correlated with IQ (Sukhodolsky, Bloch, Panza,& Reichow, 2013; White, Oswald, Ollendick, & Scahill, 2009). Among college students, greater autism symptoms have been associated with higher levels of social anxiety, depression, and aggression (White, et al., 2011). In an interview study conducted by Gelbar et al. (2014), only 31% of college students with an ASD said they could manage stress and anxiety, while 42% reported depression and 61% said they were lonely. In-depth interviews of 12 college students with ASD revealed that concerns about managing anxiety, moodiness, and ASD symptoms were prominent concerns (Nirmal, 2015). Anxiety was mentioned in 85% of articles about the experience of college students with ASD, followed by loneliness, 53%, and depression, 47% (Gelbar, et al., 2014).

By comparison, it is estimated that 18% of the U.S. general population has experienced a clinical level of anxiety in the last year, and that anxiety most often affects women, accounting for 60% of cases. (National Institute for Mental Health, n.d.). The link between anxiety, or central nervous system arousal, and performance is curved. An anxiety "sweet spot" is associated with strong performance, while too much or too little anxiety results in poorer performance. A key question this research seeks to answer is whether the co-occurring anxiety experienced by college students with ASD helps or harms their academic performance. If higher levels of anxiety are associated with academic success, ethical and practical dilemmas emerge in terms of how best to support students on the spectrum.

Executive Function

Executive function (EF) is a broad term that refers to one's ability to engage in goal-directed behavior. Planning, monitoring progress, inhibiting, shifting focus and strategy, and regulating emotion and motivation are some of the abilities included in the EF umbrella. From a practical standpoint, college students who struggle with EF may have difficulty managing time, showing up for appointments, organizing their room and course materials, starting homework,

and completing assignments. In the classroom, they may get off track in discussions, get distracted easily, and have difficulty monitoring their level of focus. EF deficits are prominent in ASD, ADHD, and other childhood psychiatric conditions (Hosenbocus & Chahal, 2012); however the profiles are distinct and deficits associated with ASD are less severe than those linked to ADHD (Corbett, Constantine, Hendren, Rocke, & Ozonoff, 2009; Happe, Booth, Charlton, & Hughes, 2006).

Perseveration, getting stuck, and inability to be flexible are EF deficits commonly found with autism, and the nature of EF deficit is hypothesized to be an important variable in the overall functioning of a person with autism (Pellicano, 2012). Evidence about the persistence of EF problems into adulthood is mixed. In a seminal study of EF in ages six to 47, Ozonoff and colleagues (1994) found impairment at all ages. Conversely, an investigation by Sachse and colleagues (2013) found impaired visual working memory, but no impairment in planning, cognitive flexibility, or cognitive inhibition for 30 adults with ASD matched to 28 controls. Given that EFs may improve for adults with ASD, the postsecondary years are an especially important time period when change may be happening.

ADHD

ASD and ADHD have a high co-occurrence, and the DSM-5 now allows for both conditions to be diagnosed in an individual. It is estimated that 30-50% of individuals who have ASD also meet the criteria for ADHD, and that 20-50% of those with ADHD meet the criteria for ASD (Rommelse, Franke, Geurts, Hartman, & Buitelaar, 2010). Due to this high co-occurrence, genetic studies have sought to identify whether ASD and ADHD share common genetic roots. Both a broad genetic liability for both disorders has been found along with specific genetic contributors (Pettersson, Anckarsäter, Gillberg, & Lichtenstein, 2013; Oerlemans et al., 2015). The genetic overlap may explain why symptoms of both conditions are often apparent in families (Oerlemans, et al., 2015).

Based on the high co-occurrence of ASD and ADHD traits, and the well-established link between ADHD traits and difficulty in academic settings, this study sought to describe ADHD traits within a sample of college students who have ASD. The hope is to create a clearer picture of college students with ASD in regard to variables that impact academics.

Research Questions

The current study describes a sample of college students with ASD and identifies factors related to their postsecondary academic success. This research analyzes the predictive value of independently measured executive function (EF) and anxiety symptoms on postsecondary academic performance. In addition, the study describes co-occurring ADHD symptomology and IQ profiles of the sample. By identifying aspects of ASD that correlate with academic success, this research can potentially help students and families set educational goals and colleges screen for support needs among students with disabilities.

The specific research questions addressed by the study are:

1. Does clinically significant EF disorder in global executive function, behavioral regulation, or metacognition affect cumulative GPA of college students with ASD?
2. Does co-occurrence of anxiety symptoms with ASD negatively influence GPA?

Methodology

The current study tracked two cohorts of college students (n=32) for a period of one year each. Nineteen started college in 2013, and 13 began in 2014. Participants were enrolled at a four-year private liberal arts college in the Northeast. All participants had a confirmed diagnosis of ASD. Participants were recruited from a social pragmatics early orientation program offered at the institution (Shmulsky, Gobbo & Donahue, 2015).

The overall purpose of the study, the time commitment for participation and the nature of research activities was described to each cohort. Informed consent was obtained in hardcopy. Only consenting students who met the DSM-5 criteria for ASD were included in the study. Student diagnoses were verified through records supplied by consenting students. Since many of the students were diagnosed prior to publication of the DSM-5, the sample includes students diagnosed with Asperger's Syndrome and Pervasive Developmental Disorder. Students who provided a diagnosis of non-verbal learning disability (NVLD) were not included in the study. Data were also collected from the students' disability documentation on their cognitive profiles, including full scale IQ, Verbal IQ, Performance IQ, Processing Speed Index, and Working Memory Index.

Students who consented to participate in the study were asked to complete three instruments: The Behavior Rating Inventory of Executive Function – Adult Version (BRIEF – A), The Adult ADHD Self Report Scale (ASRS), and the Beck Anxiety Inventory (BAI). They were also asked permission for their educational records, including grades, credits earned, and enrollment, to be accessed for one year by the research team. These instruments were administered to the students during college orientation prior to their first semester.

Measures

The BRIEF-A is a questionnaire designed to assess executive function in a variety of performance areas in everyday life. It includes nine clinical scales divided into two indexes, the Behavioral Regulation Index (BRI) and the Metacognition Index (MI). It also yields a Global Executive Composite (GEC). While it contains nine non- overlapping clinical scales, only the composite indexes were used. The BRIEF – A includes three validity scales: Negativity, Inconsistency, and Infrequency. It has been widely used clinically and in research (Baron, 2000; Roth, Isquith, & Gioia, 2005). T Scores at 65 or above are considered to be clinically significant.

The Adult ADHD Self Report Scale is a six question scale designed to screen for adult ADHD in community samples. It was developed by the World Health Organization. It is a screening scale with good internal consistency, test-retest reliability and high concurrent validity (Kessler et al., 2005; Kessler et al., 2005; Rotenberg-Shpigelman, Rapaport, Stern, & Hartman-Maeir, 2008;).

The Beck Anxiety Inventory (Beck & Steer, 1993) is a 21 item self-report scale that surveys typical features of anxiety. Subjects rate the severity of symptoms on a four point scale. A total score is calculated based on the severity ratings for all items. Beck and Epstein (1988) have demonstrated good internal consistency and test retest reliability for this instrument.

Data related to persistence and academic progress were also collected. Persistence was defined as enrollment at the college during the study. Academic progress was determined by the total number of academic credits accrued during the tracked year, and semester and cumulative grade point averages for the same time period.

Results

Descriptive Statistics

While a total of 32 students gave their consent to participate in the study, the results are based on 23 students for whom complete sets of data were available. See Table 1 for demographic and cognitive data. The sample consisted of 20 males and three females. Only one student did not persist for one semester; and this student's scores were dropped from the analysis. Persistence for at least two semesters was 86.9%, with 20 out of 23 students persisting for two semesters. The average number of credits earned per semester for the sample was eight credits, which is less than the typical 12 credits full-time load. While some students took 28 credits over two semesters, others completed only three credits in two semesters. The average age of the sample was 19 years 8 months.

The cognitive profile of the participants was representative of college students with ASD. All scored in the average range on the Wechsler Adult Intelligence Scale (WAIS). Specifically, average Verbal IQ was 110 (n=21), and the average Performance IQ was 99 (n=21), and the average Working Memory Index was 97 (n=19). Only the average Processing Speed Index was below average at 84.

Most students (86% or 19 of 22) self-reported having no or mild levels of anxiety (level 0 or 1) on the BAI scales. Very few (3 of 22) reported having moderate to severe symptoms of anxiety (level 2 or 3). On the ADHD screening scale, six students out of 23 were identified as having co-occurring ADHD symptoms. Not surprisingly, all six students with ADHD symptoms also had elevated T-scores on the BRIEF-A. For some (n=5), the executive function difficulties were reflected on the Behavioral Regulation Index (BRI) which consist of measures of inhibition, focus, emotional control and self-monitoring. Only three students with ASD and no co-occurring ADHD symptoms, also had elevated T scores on the BRIEF-A, suggesting a weak relationship between ASD without co-morbidity and executive function difficulties in this sample. Given the limited sample size, it would be difficult to generalize from this observation.

Analysis

Simple linear regression was used to investigate the relationship between cumulative GPA and executive function disorder, anxiety, and co-occurring ADHD symptoms. Each of the executive function

scales – Behavioral Rating Index (BRI), Metacognitive Index (MI) and the Global Executive Composite (GEC) were converted to binary variables with T Scores equal to or greater than 65 as '1' and '0' otherwise. Results showed a negative relationship between GPA and executive function disorder for all three scales of executive functioning. However, given limited sample size, none of the executive function scales were statistically significant at the 5% level. For BRI the result was (β = - 0.844; *df*=1; ρ = 0.06), while for MI it was (β = - 0.136; *df* =1; ρ = 0.74), and for GEC it was (β = - 0.270; *df* =1; ρ = 0.537).

To compensate for sample size, a non-parametric test (the Kruskal-Wallis Equality of Populations Rank test – KW test) was used to determine whether the cumulative GPA of students with ASD is systematically affected by executive function disorder. The K-W test revealed that GPA was statistically significantly different for BRI scores ≥ 65, (X^2= 6.422; *df* =1; ρ = 0.011). In other words, for students with ASD and elevated scores for executive function disorder on the BRI scales, GPA was significantly lower compared to those without elevated BRI scores. No similar relationship was observed for GPA and MI or GEC. Co-occurrence of ADHD symptoms and elevated anxiety did not appear to systematically affect cumulative GPA in this sample.

Discussion

The purpose of this study was to investigate variables associated with postsecondary success for students who have the diagnosis of ASD. The importance of social and pragmatic support for college students ASD has been established, but less is known about the academic needs and support for this group (Zeedyk, et al., 2016). Twenty-three college students with confirmed diagnoses of ASD and WAIS scores in the average range, completed EF, anxiety, and ADHD measures at the beginning of their first year of college, after which their grades and persistence were tracked for two semesters. A notable finding is that 22 of 23 participants persisted in college for the first two full semesters, suggesting that these individuals were a good match to the institution, where nearly all enrolled students live on campus and away from home. The focus of this study was on the link between student profile and performance.

For students who have ASD, making the transition to college can be distinctly challenging due to changes in lifestyle, academics, and expectations for independence (Pinder-Amaker, 2014). Transition support programs have emerged to help students on the spectrum persist in college (Arizona Department of Health Services, 2014; Virginia Commonwealth University, 2013). This study was conducted at a college that provides programming targeted to students on the spectrum. In addition to enrolling in typical college courses, students who have ASD are invited to participate in social groups and mentoring opportunities. Twenty-two out of 23 students remained enrolled in the college for two full semesters, and many took reduced academic loads, averaging eight credits accrued each semester. Pursuing a four-year postsecondary degree at this rate would take almost double time, and this is an area that warrants future investigation.

The executive function composite index of behavioral regulation was associated with grades in this study. Participants who had impaired behavioral regulation (BRI) were more likely to earn low grades than participants who had normal behavioral regulation, a significant finding at the .05 level. Behavioral regulation is an index of self-reported inhibitory control, shifting, and emotional control. These are among documented areas of executive function weakness associated with ASD (Merchan-Naranjo et al., 2016; Wallace et al., 2016). This current study extends what is known about EF and ASD by looking specifically at the role of EF in college performance.

The immediate practical benefit to finding the link between behavioral regulation and academic success is that it may aid transition planning and resource prioritization. Families and students who are planning for college can assess behavioral regulation in order to pro-actively identify readiness and areas of concern. Individuals who have impaired behavioral regulation can be counseled in advance of starting college that it will be important to seek out additional support, especially during the first year. Disability service offices, guidance counselors, and educational consultants can also use this information to line up services and help clients plan for a successful postsecondary transition. Faculty seeking to work effectively with students who have ASD would benefit from understanding the EF-academic performance link and strategies to support EF in course design and in the classroom.

Anxiety scores were lower than expected and did not predict academic success; however, a generalization is not possible due to the sample size. An interesting trend emerged in anxiety scores. Only three of 23

respondents indicated anxiety at a moderate or severe level. In other words, a substantial majority of participants reported little or no anxiety. Given the high co-occurrence of clinical anxiety with ASD (Sukhodolsky et al., 2013; Vasa et al., 2016; White et al., 2009), this was an incongruous finding. One speculative explanation is that the BAI, a valid screening tool in a typical population, may be ineffective in measuring anxiety in an ASD college population. The BAI queries respondents about predominantly physical manifestations of anxiety, such as raised heartrate and shallow breathing, and it has been documented that bodily awareness is impaired in individuals who have ASD (Fiene & Brownlow, 2015). Currently, the recommended assessment for anxiety in youth with ASD a multi-pronged, multi-visit approach (Vasa et al., 2016). Given the high co-occurrence between anxiety and ASD and the clinical significance of anxiety, it may be advantageous to develop an effective screening tool for this population.

As discussed in the literature review, ADHD co-occurs with ASD in a significant percentage of individuals, and an innovation in the DSM-5 allows both conditions to be simultaneously diagnosed (APA, 2013). Participants in this sample furnished diagnostic records in 2013-14, which reflected earlier diagnostic standards. There were no co-occurring ADHD diagnoses in participant records, yet six of twenty-three met the ASRS screening cut-off for ADHD. As with anxiety, quantitative generalizations cannot be made due to the sample size. From a practical standpoint, it can be useful to identify which students with ASD also have signs of ADHD so that transition planning, service, and support can be tailored to specific profile needs.

Limitations

The primary limitation of the study is its sample size, which made quantitative analysis inconclusive. Statistical links between the MI sub score of the BRIEF-A, self-reported anxiety, and academic performance were not found; however they cannot be ruled out as variables related to success based on the current investigation. A second limitation was the choice of anxiety screening tool, which may not have been a valid measure for persons who have ASD. A third limitation is the absence of a social skills or conversational skills measure in the study; because social functioning is a key deficit of ASD, testing in this area may have yielded additional useful information.

Future Research

Future research should continue to identify variables related to college performance to individuals who have ASD. Trends in increased ASD diagnosis, increased enrollment in college, and relatively poorer postsecondary outcomes for students with ASD make this a critical need. Development and empirical validation of the best methods to support postsecondary achievement for students who have ASD is another area for future investigation. In addition to the aforementioned empirical studies, it is important to cultivate the emergence of autistic voices and perspectives on postsecondary practices. This sentiment of inclusion voiced by many in the autism community should be considered in the development of research practices and resulting policies that affect them.

This investigation showed a group of college students who have ASD remaining enrolled during the first year and making steady progress toward academic degrees. The goal of this research was to describe college students who have the diagnosis of ASD and identify factors associated with their college success. One such factor was found, the behavioral regulation subset of executive functions, which consists of inhibition, shifting, and emotional control. Participants who reported normal behavioral regulation, an index of executive function, were most likely to earn good grades and vice-versa. The degree of confidence in ASD diagnosis is a strength of this study over other studies of college students which rely on self-reported diagnosis. The findings of this study can be used by families and education professionals to assist in transition planning for students with ASD. Colleges, postsecondary training institutions, and universities can also use these results to plan support services designed to close the ASD performance gap and to prioritize next steps in research.

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Table 1

Participant Demographic and Cognitive Profile Data of Sample

Subjects	Diagnosis	M/F	Age	FISQ	PIQ	VIQ	Working Memory	Processing Speed
1	ASD	M	24	132	113	142	121	81
2	ASD	M	18	114	n/a	122	112	84
3	Aspergers	M	19	86	88	108	66	81
4	ASD	M	20	102	96	107	106	97
5	Aspergers	M	n/a	104	99	108	n/a	n/a
6	PDD NOS	F	19	n/a	77	91	92	79
7	PDD NOS	M	20	86	78	107	95	86
8	Aspergers	M	18	130	125	134	n/a	n/a
9	Aspergers	F	19	96	88	95	113	97
10	Aspergers	M	18	91	94	95	100	81
11	Aspergers	M	20	101	109	112	92	81
12	ASD	M	19	n/a	105	143	100	92
13	PDD NOS	M	18	92	88	105	95	84
14	Aspergers	M	19	90	88	126	80	68
15	Aspergers	F	18	87	84	98	97	78
16	PDD NOS	M	18	97	113	108	77	79
17	PDD NOS	M	19	96	107	98	92	84
18	ASD	M	18	81	94	98	80	62
19	Aspergers	M	19	117	123	116	114	97
20	Aspergers	M	18	114	116	107	n/a	n/a
21	Aspergers	M	19	105	n/a	108	99	100
22	ASD	M	18	n/a	81	82	n/a	n/a
23	Aspergers	M	18	n/a	121	134	111	94