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A systematic review of firsthand experiences and supports for students with autism spectrum disorder in higher education

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ABSTRACT

Background: As students with autism spectrum disorder (ASD) are increasingly enrolling at institutions of higher education, their new experiences and offered supports impact their success in this realm. The current review extends previous syntheses of literature related to support systems for students with ASD in higher education, as well as their first-hand experiences.

Method: This review systematically considered experiences of students with ASD in higher education and supports offered to them in both academic and non-academic realms as reported by students themselves. Of the 2,354 screened studies, 24 met inclusion criteria for review.

Results: Students with ASD experience high rates of mental health issues, sensory challenges, and social, academic, and communication difficulties. Academic supports, which were infrequently reported, include tutoring, accommodations, and coursework modifications. Non-academic supports included social skills training, peer-mediated interventions, counseling, and other university disability services. Although available, these supports may not be fully utilized due to students' nondisclosure of their ASD diagnosis.

Conclusions: Non-academic supports for students with ASD are increasing along with this population's enrollment in higher education, yet the development of academic supports appears to be less prevalent. These findings suggest institutions of higher education focus on the development and accessibility of academic supports, and additionally, provide faculty and staff with effective professional development to address the stigmatization of seeking out and utilizing available support systems.

1. Introduction

The estimated rate of autism spectrum disorder (ASD) in adults in the United States is approximately 2.21 %, with state prevalence ranging from 1.97 % to 2.45 % (Dietz et al., 2020). Given the increased prevalence rates of individuals with ASD, it is likely that more individuals with ASD will be entering higher education. Colleges and universities in the United States and other countries have experienced a significant increase in the number of students with ASD (Barnhill, 2016; Shattuck et al., 2012). It is estimated that nearly 2 % of students enrolled in higher education institutions could meet the criteria for ASD (Ward & Webster, 2018), and it is likely that the numbers will continue to increase (Kuder & Accardo, 2018). Although students with ASD frequently possess academic strengths that typically facilitate success within higher education (e.g., attention to detail, memory recall, focus and determination on specific tasks; Drake, 2014; Gobbo & Shmulsky, 2012), this population has been shown to graduate at significantly lower rates when compared

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to their typically developing peers and students with other disabilities (McFarland et al., 2017; Newman et al., 2011). Considering that college graduates with ASD reported a higher, long-term quality of life (e.g., increased employment rates, higher wages) compared to non-graduates with ASD (Hendrickson et al., 2013), the concern about their higher education outcomes is especially relevant.

Historically identified as various pervasive developmental disorders, ASD has been characterized as a spectrum, with individuals demonstrating difficulties in areas such as communication, interpersonal interactions, sensory integration, and difficulties with changes that impact daily functioning, all of which are critical for success in educational settings (Turnbull et al., 2020). Students with ASD have reported specific challenges in the areas of assignment completion, disclosure of disability, access of supports, and routine university life (Cai & Richdale, 2016; Van Hees et al., 2015). The experiences of students with ASD in higher education vary and include feelings of isolation, nervousness, sadness, struggles with peers, bullying, and being ostracized (Anderson et al., 2018; Gelbar et al., 2014). Transitioning to larger class sizes at institutions of higher education, as well as the reduced structure of the environment, can increase distraction and produce feelings of anxiety (Jansen et al., 2017). Within the new classroom environments, students with ASD have experienced teaching and evaluation practices that are not inclusive to their needs, deterring them from acquiring and demonstrating their knowledge (Jansen et al., 2017). These common barriers have been shown to increase isolation, loneliness, and depression, feelings to which this population may be especially prone (Madriaga, 2010; Mazurek, 2014). Although most institutions have developed services and supports for students with disabilities, many might be ineffective or inadequate for individuals with ASD (Anderson et al., 2017; Smith, 2007). The unique characteristics and needs of students with ASD require an individualized approach to ensure successful achievement of higher education outcomes.

Therefore, the call exists for institutions of higher education to strengthen post-secondary supports for students with ASD that would assist them with obtaining postsecondary education, and navigating the world of adulthood. In higher education, provision of services and support for students with ASD is regulated by two major federal legislations - Section 504 of the Rehabilitation Act (Section 504) and the Americans with Disabilities Act (ADA). Under these laws, institutions of higher education must consider reasonable accommodations for students with disabilities to ensure their equal access to academic and non-academic programs (Keenan et al., 2019; Newman & Madaus, 2015). Too often, accommodations and supports provided to students with ASD in higher education are similar to those offered to students with other disabilities and may not meet the needs of students with ASD (Kuder & Accardo, 2018). Some institutions of higher education provide supports beyond basic disability student service programs; however, those specialized social, communication, and organizational support programs often result in additional tuition fees for students with ASD (Anderson et al., 2017; Think College, 2020).

There is limited research that addresses the needs of adults with ASD (Jang et al., 2014) and the extant literature on higher education experiences and needs of students with ASD is particularly scarce (Anderson et al., 2019; Gelbar et al., 2014). Especially limited is the current body of research focused on first-hand experiences of college students with ASD (Anderson et al., 2017; Zeedyk et al., 2016). Studies of experiences for college students with ASD from students' perspectives begin to systematically identify supports and services for students with ASD in higher education. For example, Gelbar et al. (2014) systematically reviewed studies published between 1999 and 2013 and identified academic supports in higher education settings ranging from variations of note-taking, tutoring, testing accommodations, and coursework modifications. Gelbar et al. (2014) described first-hand experiences of 68 college students with ASD that were reported in 18 studies. Reported non-academic supports included peer mentoring, counseling, and social supports. A more recent review summarizing the available research evidence was published in 2017 by Anderson and colleagues who conducted their database search in 2015 and reviewed studies published between 1995 and 2015. Anderson et al. (2017) focused on first-hand experiences of students with ASD in higher education and expanded academic supports to include categories such as organizational skills, time management, writing skills, study skills, academic skills development, managing test anxiety, self-monitoring, self--regulated learning, academic advising, and goal setting. In their study, Anderson et al. (2017) reported experiences of 378 participants in 23 studies. Kuder and Accardo (2018) conducted a systematic literature review focused on intervention research and identified programs and services for students with ASD in higher education that had available data outcomes. However, Kuder and Accardo's (2018) synthesis was limited by a small number of key terms and unreported interrater reliability on article selection, coding, and analysis. The latest review of empirical research in this area was published in 2019 by Anderson, Stephenson, Carter, and Carlon. Anderson et al. (2019) conducted their database search in August of 2017 and analyzed studies that reported only quantitative outcomes of interventions used to support students with ASD in higher education.

In order to develop effective programs for college students with ASD and enhance their outcomes in higher education, it is critical to understand the experiences and challenges they face in these settings. It is equally important to understand effective higher education supports documented in the current literature. However, research describing the challenges and supports faced by college students with ASD is insufficient for the demand. Due to the recent increase in empirical research in this area over the last few years, an updated systematic review is required to extend upon previous review findings. The purpose of the present review is to update and extend upon the previous syntheses of literature related to higher education support systems and services for degree-seeking students with ASD and their higher education experiences as reported by students themselves. The following research questions guided the review:

1. What experiences do college students with ASD report having in both academic and non-academic realms?
2. What academic supports and services are offered to assist college students with ASD as reported by students themselves?
3. What non-academic supports and services are offered to assist college students with ASD as reported by students themselves?

2. Method

2.1. Inclusion criteria

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guided the methodology and reporting of this review (see Fig. 1; Moher et al., 2009). A systematic literature review was carried out and studies were selected for review based on the following criteria. First, studies had to contain participants who were degree-seeking students with ASD currently attending a degree-granting college or university (e.g., university or community college degree-seeking students with ASD). Second, studies were focused on college-based or provided support systems, services, or experiences of college students with ASD (e.g., academic accommodations, social support groups). Third, studies included a first-hand description of supports, services, or experiences of one or more students with ASD (e.g., mental health issues reported by students themselves). Fourth, studies were published in a peer-reviewed

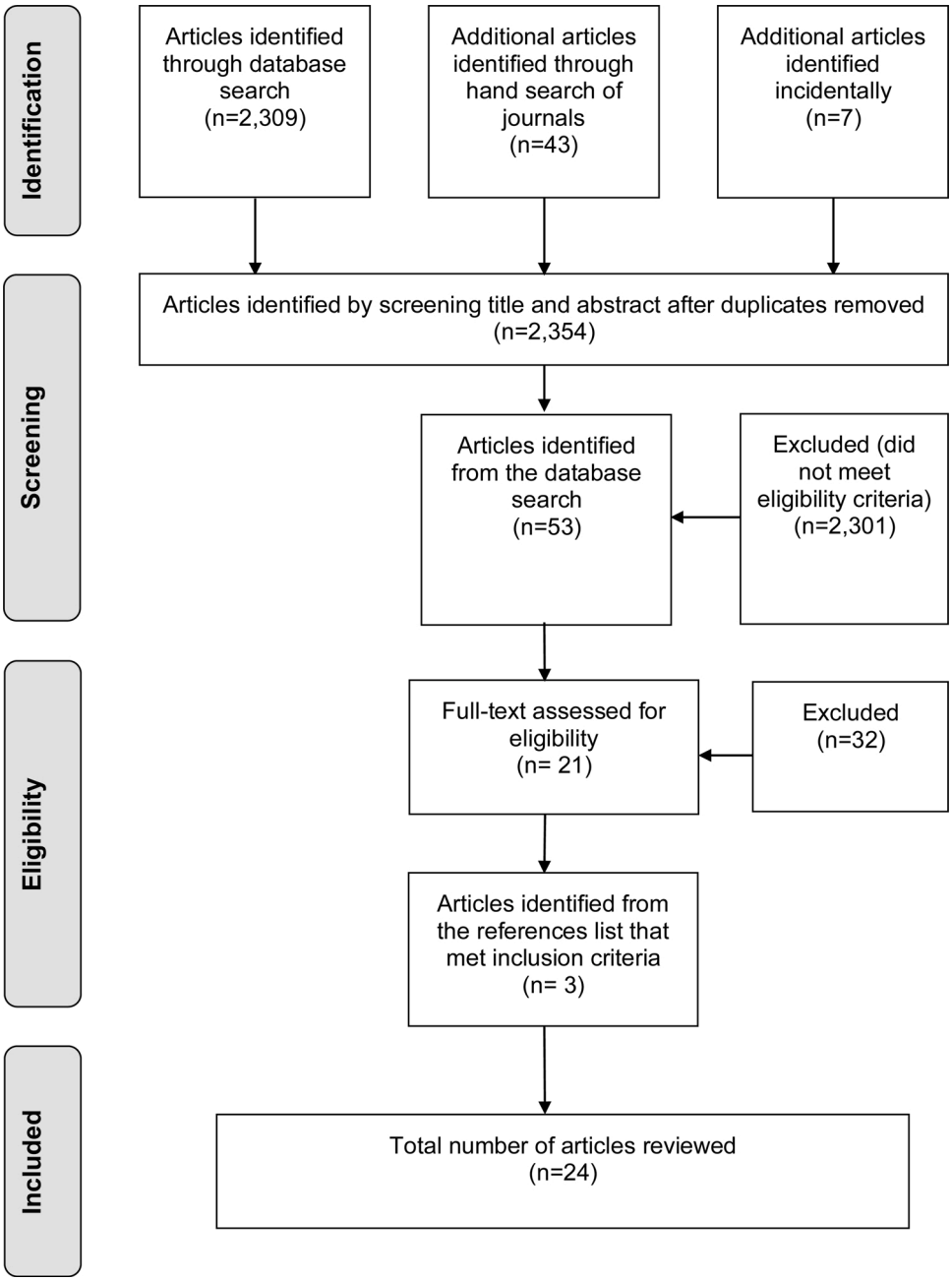


Fig. 1. PRISMA inclusion flow diagram.

English language journal between years 2015–2019. As this review focused solely on the perceptions and experiences of current students with ASD, studies were excluded if pertinent data that could not be disaggregated for this population (e.g., current college students combined with graduates, high school/pre-college students combined with current college students).

2.2. Search methods

A search for studies addressing higher education experiences and supports for students with ASD was conducted using four educational electronic databases: Academic Search Complete, Education Source, Educational Resources Information Center (ERIC), and PsycINFO, in November 2019. The abstracts and titles were searched using the following full and abbreviated search terms: (autis* OR Asperger* OR Rett* OR Pervasive Development* Disorder* OR PDD* OR high-functioning autism OR HFA) AND (postsecondary education OR post-secondary education OR higher education OR universit* OR college*).

The initial search produced 10,412 unique results across the four databases. In replication of Anderson et al.'s (2017) procedures, all abstract and titles were screened as to whether: (a) the participants were post-secondary students with ASD; (b) the study was conducted in a post-secondary education institution; (c) the article described a research study; (d) the study examined student experiences and/or supports provided to them; (e) the study was informed by first-hand accounts. The screening resulted in 2,309 studies being identified. Seven studies were found incidentally during the initial screening of the database articles. Researchers were directed to these studies by the database engine, which suggested the studies were similar to the ones already being screened. Following the database search, nine ASD-focused journals published between 2015 and 2019 (i.e., *Advances in Autism, Autism, Autism Research and Treatment, Education and Training in Autism and Developmental Disabilities, Focus on Autism and Other Developmental Disabilities, Good Autism Practice, Journal of Autism and Developmental Disorders, Review Journal of Autism and Developmental Disorders, and Research in Autism Spectrum Disorders*) and two journals specialized in post-secondary education (i.e., *The Journal of Postsecondary Education and Disability and The Journal of College Student Development*) were hand searched. Additionally, 43 studies were identified through the hand search process. In total, 2,354 studies were identified (after 5 duplicates were removed).

Next, the full texts of identified studies were screened against the same inclusion criteria. Following Anderson et al. (2017) exclusion procedures, studies with up to 20 % of participants without a formal diagnosis of ASD (i.e., self-identified) were included due to paucity of studies that addressed the needs of college students with ASD, high cost of formal evaluation, perceived stigma of an ASD label. Studies were also excluded if they contained: (a) non-college students with ASD (e.g., high school students entering college); (b) pertinent data that could not be disaggregated for students with ASD without confounding the interpretation of the study (e.g., current college students and recent graduates, high school students and current college students); (c) any programming provided in the community or on-campus but not paid for by the post-secondary institution; (d) experimental or intervention reports that did not include first-hand experiences and supports for students with ASD, but instead measured a characteristic of this population (e.g., roommate relationships); and (e) more than 20 % of the total participant pool did not have a formal diagnosis (i.e., participants self-identified as having ASD). After the database search, the reference lists of the included studies were examined and additional three studies that met the inclusion criteria were identified.

2.3. Data extraction and coding

Codes were provided within the database as a checklist within each category, and were recorded as present when reported/observed. Items that were observed/reported that did not fit a coding category were recorded as 'other' and provided in a detailed description. These items were discussed as a team until consensus was met as to the appropriate coding category and/or development of a unique code for the items. For all articles, nine variables related to participant characteristics, their experiences, and reported supports were coded. The following six variables related to the participants were coded: (a) location of the educational institution the participants were attending (e.g., United States, Australia, Netherlands); (b) post-secondary education setting (e.g., university, community college); (c) number of participants with ASD; (d) reported diagnosis (e.g., ASD, Asperger's syndrome); (e) gender; and (g) age range (when range was not available, other measures such as means are reported).

The participants' experiences and reported higher education supports were coded within three coding categories (Gelbar et al., 2014). One, first-hand experiences, defined as those reported by students themselves (i.e., self-reported). Two, academic supports, defined as academic accommodations and/or curricular modifications and/or any service provided that better allowed students to complete their coursework. And three, non-academic supports defined as those that allowed for addressing students' social, emotional, and community needs and better facilitation of their self-determination. The codes and related examples below were utilized within the aligned categories.

First-hand experiences of the participants with ASD were coded as: (a) mental health issues (e.g., anxiety, depression, stress); (b) social difficulties (e.g., loneliness, social isolation); (c) academic difficulties (e.g., lack of structure, group work difficulties); (d) self-determination (e.g., goal setting); (e) weak communication; (f) sensory challenges (e.g., sensitivity, dislike of crowds); (g) self-disclosure; (h) mistreatment (e.g., bullying, marginalization, discrimination); (i) community engagement (e.g., volunteering, leisure, employment); (j) academic efficacy (e.g., good grades, on track for graduation); (k) housing and transportation concerns; (l) parental involvement; (m) faculty relationships; and (o) scheduling issues. Academic supports were coded as: (a) none reported; (b) professional support (e.g., faculty mentor, coach, advisor); (c) testing accommodations (e.g., separate location, extended time); (d) in-class accommodations (e.g., note-taker/scribe, lecture notes); (e) coursework accommodations (e.g., assignment substitution, curricular changes); (f) assistive technology; (g) transition program; (h) study skills training; (i) writing support (e.g., writing center); (j) university disability services; (k) priority registration; (l) self-determination training (e.g., self-management, problem-solving); (m)

Table 1
College Experience and Supports for Students with ASD.

Study and country	Settings	N	Diagnosis	Gender	Age	Experience	Academic supports	Non-academic supports
Accardo et al. (2019) USA	University	23	ASD	M = 20 F = 3	18–25	Academic difficulties Faculty relationships Mental health issues Self-determination	Assistive technology Coursework modifications In class accommodations Priority registration Professional support Testing accommodations Writing support	Counseling Housing and transportation accommodations Peer-mediated support Professional support Self-determination training Social skills support Transition program
Alverson et al. (2019) USA	University, community college	5	AS	M = 5 F = 0	19–22	Academic difficulties Academic efficacy Community engagement Mental health issues Parent involvement Self-determination Self-disclosure Sensory challenges Social difficulties Weak communication	Writing support	Counseling Financial support Parent involvement University disability services
Anderson et al. (2018) Australia	University	48	AS	M = 23 F = 24 other-1	17 and above	Academic difficulties Academic efficacy Community engagement Mental health Mistreatment issues Sensory challenges Social difficulties Weak communication	Coursework modifications In class accommodations Professional support Self-determination training Testing accommodations	Counseling Financial support Housing and transportation accommodations Peer-mediated support Self-determination training Social skills support Transition program University disability services
Bell et al. (2017) Ireland	Institutions of higher education	6	ASD	M = 6 F = 0	17–19	Academic difficulties Housing and transportation concerns Self-determination Self-disclosure Weak communication	None reported	Parent involvement Professional support
Bolourian et al. (2018) USA	University	13	ASD	M = 8 F = 5	17–27	Academic difficulties Community engagement Mental health issues Self-determination Self-disclosure Sensory challenges Social difficulties	None reported	Housing and transportation accommodations Social skills support
Cai and Richdale (2016) Australia	University, TAFE	23	ASD	M = 16 F = 7	17–59	Academic difficulties Mental health issues	Coursework modifications In class accommodations	Counseling Parent involvement

(*continued on next page*)

Table 1 (*continued*)

Study and country	Settings	N	Diagnosis	Gender	Age	Experience	Academic supports	Non-academic supports
						Mistreatment Parent involvement Self-disclosure Sensory challenges Social difficulties	Testing accommodations	University disability services
Weak communication								
English (2018) UK	University	1	Autism	N/A	N/A	Mental health issues	None reported	Peer-mediated support
				M = 14		Academic difficulties	Coursework modifications	Parent involvement
				F = 10		Academic efficacy	In class accommodations	Peer-mediated support
Gurbuz, Hanley, and Riby (2018) UK	University	26	ASD		26.35*	Mental health issues	Testing accommodations	
				Other = 2		Sensory challenges Social difficulties Weak communication	Peer-mediated support	University disability services
							Professional support	
				M = 18		Mental health issues		Peer-mediated support
Hastwell et al. (2017) UK	University	28	HFA and AS	F = 10	N/A	Self-determination Sensory challenges Social difficulties	None reported	Social skills support
				M = 51		Academic difficulties	Counseling	Counseling
Hillier et al. (2018) USA	University	52	ASD	F = 1	18–28	Mental health issues Mistreatment Sensory challenges Social difficulties Weak communication	University disability services	University disability services
				M = 26		Housing and transportation concerns	Professional support	Counseling
Jackson et al. (2018) USA, Canada, UK	University, community college, transition	56	ASD, HFA, AS, PDD-NOS	F = 26	18–57	Mental health issues	Study skills training	Housing and transportation accommodations Peer-mediated support
				Other = 4		Mistreatment Social difficulties	Testing accommodations	Social skills support
				M = 27		Academic difficulties	Professional support	
Jansen et al. (2017) Belgium	Institution of higher education	43	ASD	F = 16	N/A	Mental health issues Self-determination Sensory challenges Social difficulties Weak communication	Testing accommodations	None reported
				M = 3		Mental health issues		Social skills support
Koegel et al. (2016) USA	University	3	ASD	F = 0	18–25	Social difficulties Weak communication	Not reported	Video-modeling
						Community engagement	Professional support	Counseling
Lucas and James (2018) UK	University	12	N/A	N/A	18–20	Mental health issues Self-determination Social difficulties	Testing accommodations	Peer-mediated support Professional support Social skills support University disability services
				M = 58		Academic difficulties Faculty relationships		
McLeod et al. (2019) USA	University, community college	95	Autism	F = 37	21.78*	Mental health issues Mistreatment Social difficulties	None reported	Professional support

(*continued on next page*)

Table 1 (*continued*)

Study and country	Settings	N	Diagnosis	Gender	Age	Experience	Academic supports	Non-academic supports
McMorris et al. (2018) Canada	University	45	ASD	M = 37 F = 8	21.03*	Mental health issues Scheduling issues Self-determination Weak communication	None reported	Counseling
Roberts and Birmingham (2017) Canada	University	9	HFA	M = 7 F = 2	19–24	Scheduling issues Self-determination Social difficulties Weak communication	None reported	Peer-mediated support Problem-solving skills/ lessons Social skills support
Sayman (2015) USA	Community college	1	ASD	M = 0 F = 1	N/A	Academic difficulties Mental health issues Mistreatment Self-determination Self-disclosure Social difficulties	Peer-mediated support	Professional support skills/lessons Self-determination training
Schindler et al. (2015) USA	University	11	AS	M = 7 F = 4	18–20	Academic difficulties Housing and transportation concerns Mental health issues Mistreatment Parent involvement Self-determination Self-disclosure Sensory challenges Social difficulties Weak communication	Transition program	Transition program
Shmulsky et al. (2017), USA	University	23	ASD	M = 20 F = 3	19.8*	Academic difficulties Mental health issues Self-determination Self-disclosure	None reported	None reported
Spiers (2016), UK	University	7	Autism	M = 4 F = 3	N/A	Academic efficacy Mental health issues Self-disclosure Sensory challenges Social difficulties Weak communication	Assistive technology In class accommodations Professional support Transition program	Professional support University disability services
Tops et al. (2017), Netherlands	University	26	ASD	M = 20 F = 6	18–22	Academic difficulties Self-determination	Study skills training	None reported
Weiss and Rohland (2015), USA	University	23	ASD	M = 15 F = 8	N/A	Academic difficulties Self-determination Weak communication	None reported	None reported
White et al. (2016), USA	University	8	ASD	M = 5 F = 3	18–23	Academic difficulties Self-determination Social difficulties Weak communication	None reported	Social skills support

Note: ASD - autism spectrum disorder; HFA - High Functioning Autism; AS – Asperger's syndrome; PDD-NOS - Pervasive Developmental Disorder – Not Otherwise Specified; TAFE - Technical and Further Education; N/A – Not available, also includes situations when characteristics of participants with ASD could not be determined; *denotes reported mean age when age range could not be determined.

peer-mediated support; and (o) counseling. Finally, non-academic supports were coded as: (a) none reported; (b) social skills support (e.g., instruction, curriculum, social groups); (c) peer-mediated support (e.g., peer mentor); (d) counseling (e.g., one-on-one counseling, group counseling); (e) university disability services; (f) professional support (e.g., faculty mentor, coach); (g) parent involvement; (h) housing and transportation accommodations; (i) self-determination training (e.g., self-management, problem-solving); (j) transition program; (k) financial support (e.g., scholarship, grant); and (l) video modeling.

2.4. Reliability

Three researchers with backgrounds in special education (i.e., two co-authors and a trained graduate assistant) were trained in a one-hour session on the screening procedures. Interrater reliability (IRR) was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100 %. These researchers then completed an initial screening of 10 articles (i.e., reliability check; IRR > 90 % agreement across researchers). Next, two researchers independently screened the titles and abstracts of remaining articles and agreement was 93 % with disagreements resolved by consensus. Finally the full text of the included articles were screened by two researchers independently and interrater reliability was found to be 89 % with differences resolved by consensus.

The coding manual and database were developed by the lead researcher in alignment with the coding categories, definitions, and procedures used by Gelbert et al. (2014) and Anderson et al. (2017). Three researchers were trained on coding procedures and codes. First, two articles were randomly selected and coded as a team. Next, to evaluate the training, five articles were randomly selected for independent double-coding. Across researchers and coding categories interrater reliability was found to be 94 %. Moving forward, 25 % of all included articles were randomly selected for double-coding. Across these articles, interrater reliability averaged 93 % across coders. All differences were resolved by consensus.

3. Results

A total of 24 studies were included in this review. Table 1 provides findings related to article characteristics, settings, participant demographics, diagnoses, reported first-hand experiences, academic supports, and non-academic supports in higher education.

3.1. Article characteristics

The majority of the identified 24 studies were conducted in the United States ($n = 11$; 46 %) with the balance coming from the UK ($n = 5$; 21 %), Australia ($n = 3$; 12.5 %), Canada ($n = 2$; 8 %), Ireland ($n = 1$; 4%), Netherlands ($n = 1$; 4 %), and Belgium ($n = 1$; 4 %). One study reported combined findings from the United States, the UK, and Canada ($n = 1$; 4 %). The majority of the studies took place at universities ($n = 17$; 71 %), and the remaining studies took place at other post-secondary institutions such as community colleges, Technical and Further Education colleges (TAFE), institutions of higher education, and other post-secondary institutions (a single reported setting or a combination of two or more of the reported settings [e.g., university and community college, university and TAFE]; $n = 7$; 29 %).

3.2. Participants characteristics

Collectively, there were 587 participants across the 24 identified studies, and their ages ranged from 17 to 59. Six studies did not report the age of their participants and four studies reported only the mean. The most prevalent diagnosis reported in the identified studies was ASD ($n = 14$; 54 %), followed by Asperger's syndrome (AS; $n = 3$; 13 %), and autism ($n = 3$; 12 %). Two studies (8 %) had participants with ASD and AS, high functioning autism (HFA) and AS, and participants with ASD, HFA, AS and PDD-NOS. One study did not report the diagnoses. In the studies that classified gender, 390 were males (67 %) and 178 were females (30 %). Seven participants (1 %) had their gender classified as other. Two studies did not provide information about the gender of their participants. The average sample size was 24, and there was a range from one to through 95 participants.

3.3. Research question 1: college experiences

The first research question asked what experiences do college students with ASD report having in both academic and non-academic realms. First-hand experiences of students with ASD in higher education were described in all 24 studies. Mental health issues ($n = 19$; 78.2 %) was the most common reported experience, followed by social difficulties ($n = 17$; 70.8 %), academic difficulties ($n = 16$; 66.7 %), difficulties with self-determination skills ($n = 15$; 62.5 %), weak communication ($n = 14$; 58.3 %), and sensory challenges ($n = 10$; 41.7 %). Participants also described their experiences of having difficulties with self-disclosure of their disability in eight (33.3 %) studies. Mistreatment concerns were reported in seven studies (29.2 %). Table 1 shows a summary of student experiences along with academic and non-academic support.

3.4. Research question 2: academic supports

The second research question examined what academic supports and services are offered to assist college students with ASD as reported by students themselves. The studies reported on a range of higher education supports for students with ASD. Almost half of the

examined studies ($n = 11$; 45.8 %) did not describe any supports or services related to academics. Types of academic support were described in 14 studies (53.8 %). Professional support ($n = 7$; 29.2 %) and testing accommodations ($n = 7$; 29.2 %) were the most common types of academic support. Other often reported supports were in class accommodations ($n = 5$; 20.8 %) and coursework modifications ($n = 4$; 16.7 %).

3.5. Research question 3: non-academic supports

The third research question examined what non-academic supports and services are offered to assist college students with ASD as reported by students themselves. All but three studies described non-academic support and services provided to college students with ASD. The majority of these supports were in the form of social skills support ($n = 9$; 37.5 %), peer-mediated support ($n = 8$; 33.3 %), counseling ($n = 8$; 33.3 %), and university disability services ($n = 7$; 29.2 %). Studies also described professional support ($n = 6$; 25.0 %), parent involvement ($n = 4$; 16.7 %), and housing and transportation accommodations ($n = 4$; 16.7 %) as frequently reported types of non-academic support.

4. Discussion

The present systematic review of literature shows the exponential growth of research focused on students with ASD in higher education. Recent reviews targeting students with ASD in institutions of higher education have included up to 18 and 23 studies through 2014 and 2017 respectively (Anderson et al., 2017; Gelbar et al., 2014). The present review updates and extends upon these previous reviews by identifying studies published within the last few years. The identification and inclusion of 24 studies in this synthesis signals a marked increase of research, need, and overall enrollment of students with ASD within higher education settings. With the identification of first-hand experiences, current support systems, as well as barriers within these systems, the field can be more ready to address the areas of need through future empirical research and the development of evidence-based practices.

4.1. Experiences

The findings related to first-hand experiences of college students with ASD align with earlier syntheses findings, showing this population to encounter feelings of loneliness, anxiety, stress, and depression at high rates (Gelbar et al., 2014). These experiences may stem from frequently reported social difficulties, such as loneliness and social isolation, and more specifically, issues in developing and maintaining friendships and working relationships with individuals outside of their immediate family (Ashbaugh et al., 2017). Academic difficulties, as well as successes, were also common for this population. Self-identified deficits were found in executive functioning skills, general problem-solving, and organization and/or time management, all of which are characteristic challenge areas for students with ASD and suggests these issues are transitioning into the higher education realm along with student strengths (Sarrett, 2018). Additionally, some of these deficits may be exacerbated by the structure of traditional college classrooms. Lack of structure in instruction (e.g., lecture styles), and changes in class schedules (e.g., canceled classes or inconsistent routines) may become obstacles for students attempting to develop effective routines for acquiring and applying knowledge. Further, across content areas, students with ASD frequently identify struggles in writing skills and working on group projects, signaling a need for more support in prerequisite skill development and social skills training in academic domains (e.g., collaboration skills and strategies for group assignments). These challenges align with the instructional preferences of this population, where requests for more online course options are frequent (Sarrett, 2018).

Self-reports of weak communication skills, a typical deficit for this population (Zager & Alpern, 2010), may attribute another frequently reported experience of not disclosing their ASD diagnosis with the institution and disability support services. By not disclosing their disability, these students may not be receiving the appropriate support services that may be available from the institution. Detrimental academic and social outcomes from this possible source, can be found across studies, as participants reported negative experiences with academic efficiency and productivity due to self-management (e.g., organization, distractibility), environmental sensitivities (e.g., class sizes, lack of structure, ineffective instructional methods), and outside of classroom experiences such as transportation concerns and scheduling changes. These findings suggest that universities can be more accommodating, by possibly providing simple environmental modifications to support the unique needs and sensitivities of this population (Robertson & Simmons, 2015; Tavassoli et al., 2014).

The importance and challenge of building and maintaining relationships was a common theme across experiences of students with ASD in higher education. The reliance of parental and family relationships when transitioning to college and throughout attendance were especially important for success, as identified by these students. Additionally, faculty relationships were found to be important when positive relationships were established, but detrimental when barriers to creating a connection were present (Hillier et al., 2018; LeGary, 2017). Outside of academia, these students noted less frequent experiences with leisure, volunteer, or employment activities, which may support the high rates of social isolation. These domains may contribute to one's overall quality of life and may require more direct facilitation by transition teams, university disability services, and related service providers.

The reported experiences suggest that students with ASD are unsupported academically, socially, and emotionally by the current academic and non-academic systems in higher-education settings. If students with ASD are experiencing challenges, which lead to, or exacerbate negative social-emotional wellbeing, their participation and completion of academic requirements becomes far less likely (Ashbaugh et al., 2017).

4.2. Academic supports

A range of supports and services related to the academic realm were described in 14 examined studies. The most often reported types of academic support were professional support, testing and in class accommodations, and coursework modifications. These findings generally align with previous research indicating that extended time for completing exams is a frequently used accommodation and is perceived as the most effective by the students with ASD (Kuder & Accardo, 2018). The present study's findings also align with study results from Anderson et al. (2017) and Gelbar et al. (2014) who systematically reviewed available literature and reported similar academic supports (e.g., a separate testing location, lecture notes, scribe, extended deadlines on assignments, curricular modifications, and professor facilitation). Testing accommodations such as extended time and taking exams with a small group of students might be effective for stress reduction and managing executive functioning difficulties (Kuder & Accardo, 2018).

Academic supports are rated by students with ASD as the most helpful in their college endeavors (Anderson et al., 2018). However, almost half of the studies examined in this systematic literature review did not describe any supports related to academics. This might be due to the fact that students with ASD may not be fully aware of their needs or services available, and they may find it difficult to navigate the array of university disability services (Anderson et al., 2017; Pinder-Amaker, 2014). It may also be due to students choosing not to make their diagnosis known caused by perceived stigma, thus being unaware and/or not seeking out available services (Gelbar et al., 2014).

4.3. Non-academic supports

Research suggests that students with ASD are greatly concerned about dealing with their social rather than academic challenges that might be related to persistent struggles with issues associated with communication, social skills, and sensory challenges (Van Hees et al., 2015). The present study's finding indicate that the majority of non-academic supports provided to students with ASD in institutions of higher education were in the form of social skills support, peer-mediated support, and support form professionals, counselors, university disability services providers, and parents, as well as housing and transportation accommodations. Similarly, Anderson et al. (2017) systematically reviewed available literature and found that social skills supports (e.g., workshops, support groups) and supports from non-academic mentors, counselors, and parents were reported by students with ASD.

The results of the present study also align with Van Hees et al.' (2015) findings who reported that college students with ASD stressed the need for psychological and social supports from professionals, parents, and disability service providers. White et al. (2019) evaluated a transition support curriculum for students with ASD with noted importance of parental and counseling support in the transition process. Similarly, Shmulsky et al. (2015) explored a college transition program for students with ASD and found that parental involvement and meeting student residential needs were among the critical components of the program. The present study's findings also correspond with Gelbar et al.'s (2014) results that reported peer-mediated non-academic supports for college students with ASD, in addition to parental support and counseling. In their analysis of literature, Anderson et al. (2017) found a mismatch of supports where more academic supports were offered, even though student-preferred supports were those related to social, emotional, and daily living issues. The present study's findings suggest there are more non-academic supports and services reported by students with ASD as compared to academic supports.

5. Limitations

The results of the present systematic literature review are limited by several factors. The first limitation, although necessary for the present review, consists of some of the exclusionary factors that were identified for the review. These were comprised of not including studies with high school seniors transitioning into college, experimental reports, and studies with ASD self-identified by the participants. Information from these studies may have resulted in different or additional information. Although academic and non-academic supports were identified, a second limitation of the present review is that the overall effectiveness of identified programming and supports were not evaluated. An additional limitation was not including or analyzing cultural and linguistic information to investigate how these factors may be influencing not only the individuals, but the systems they function within.

6. Implications and future research

Despite the limitations, the present study has important implications for practice and research. The findings of the present review further set the foundation of themes associated with experiences and supports identified by students with ASD in higher education. Implications include expanding effective supports within higher education institutions, as the results suggest a lack of specific and individualized academic supports for students with ASD. Self-reported experiences of students with ASD validate the ground work for utilizing a systemic approach that begins with ongoing professional development for all college faculty and staff on ASD awareness (Spiers, 2016). This could also expand to not only to the development and provision of supports and services targeting specific student needs, but also creating accessibility to such supports by students with ASD and faculty or staff. In conjunction, by reducing the stigma associated with ASD, institutions of higher education may promote inclusive culture in the classroom and increase the likelihood of improved outcomes for students with ASD.

As knowledge of ASD continues to advance, the implications for future research evolve as well. Due to this review's focus on current students with ASD, an area of future research should include recent and former graduates of higher education programs, which could provide additional perspectives and reflections on experiences within, and following, attendance. Additionally, effects of identity

development and awareness, as well as cultural and linguistic factors should be investigated by future research. The sociological, behavioral, and economic impacts on institutions of higher education are yet other factors to be explored. Future research should also examine barriers, challenges, and benefits experienced by post-secondary students with ASD and how student strengths may be embedded into the support programs. In addition, the perspectives of families, college administrators, faculty and service providers should also be considered in future investigations.

7. Conclusion

The number of students with ASD attending colleges and universities continues to grow (Barnhill, 2016). This systematic review's findings suggest that the number of studies addressing the needs of students with ASD in higher education are on the rise. This further indicates an upturn in the significance of attention being given to students with ASD and the associated pillars of achievement. Some common struggles and realities exist for students with ASD in higher education settings, even across different countries. Social support systems, although prevalent (e.g., social skills instruction), do not seem to be aligned with the self-reported mental health challenges of students with ASD (e.g., anxiety, depression). Additionally, the types and utility of academic supports reported appear to be general in nature (i.e., provided to students with any disability), and may require more individualized approach in relation to the unique characteristics and needs of students with ASD (e.g., environmental modifications). Increasing awareness, assistance, and accessibility of higher education supports, programs, and interventions, and ultimately the knowledge base of ASD for implementing personnel, are key considerations for improving the experience and education of students with ASD in higher education.

Declaration of Competing Interest

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