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Adjustment Across the First College Year: A Matched Comparison of Autistic, Attention-Deficit/Hyperactivity Disorder, and Neurotypical Students

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Abstract

Background: Although the number of autistic students attending higher education has grown substantially in recent decades, little is known about factors that support their retention and persistence in college. First-year experiences and adaptability to the college environment greatly impact students' decisions to remain enrolled. Despite the importance of first-year adjustment to persistence and retention, few studies have examined the adjustment experiences of first-year autistic students compared to those of matched nonautistic students.

Methods: This study used national survey data to compare the first-year college adjustment experiences of 222 freshmen, including 74 self-identified autistic students, 74 students with attention-deficit/hyperactivity disorder (ADHD), and 74 students without diagnoses (referred to as neurotypical; NT), matched on mental health and demographic characteristics. Students were compared on measures of academic, social, emotional, and institutional adjustment at the end of freshman year. Separate general linear models were used to investigate predictors of positive self-reported first-year adjustment.

Results: Autistic students reported significantly lower levels of social self-confidence than their NT and ADHD peers at the end of freshman year. On all other adjustment domains, students in the autism, ADHD, and NT groups did not significantly differ. Autistic students were not significantly different from their ADHD and NT peers in terms of satisfaction with their college experience or sense of belonging to their institution. Social factors, including social self-confidence and ease of making friends, emerged as important contributors to positive first-year adjustment outcomes across all groups.

Conclusions: When controlling for demographic factors and mental health characteristics entering college, autistic students do not significantly differ from their NT and ADHD peers on several domains of college adjustment. Future studies should further investigate the impact of mental health and student characteristics on college trajectories and outcomes for autistic students.

Keywords: autism spectrum disorder, adjustment, higher education, matched comparison groups, mental health

Community Brief

Why is this an important issue?

Although more autistic young people are enrolling in college, many do not finish their degrees. Adjusting more easily to college life in the first year can encourage students to stay enrolled. Not much is known about adjustment for autistic college students, in particular compared with their nonautistic peers.

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What was the purpose of this study?

Our goal was to understand whether there were differences in how the three groups of first-year students adjust to college. Those three groups included the following: (1) autistic students, (2) students with attention-deficit/hyperactivity disorder (“ADHD”), and (3) neurotypical (“NT”) students (those who do not identify as having a disability). We wanted to see if the groups were similar or different in their first-year experiences. We also wanted to know what factors help autistic students adjust and feel comfortable during their first year.

What did the researchers do?

We compared survey responses about first-year adjustment across three groups of students. We know that students’ background can affect their experience in college, so we matched each autistic student to one student with ADHD and one NT student so that they had similar background characteristics (e.g., gender and high school test scores). We compared the groups on campus, academic, emotional, and social experiences during the first year of college. Lastly, we determined which factors were most important for the successful first-year adjustment of autistic college students.

What were the results of the study?

Autistic students were less confident socially than their ADHD and NT peers but were not significantly different from their peers on many other domains, including satisfaction with their college experience. Having more social self-confidence and making friends more easily were important to the first-year adjustment of all students.

What do these findings add to what was already known?

While previous studies looked at academic adjustment, this study adds information about the social, emotional, and institutional adjustment of autistic college students.

What are the potential weaknesses of the study?

We used surveys that were not specifically designed for autistic and other neurodivergent people. Students who dropped out during their first year were not included in this study, and so, our findings only apply to students who completed their first year. There were a relatively small number of students in each group, which may have made it harder for us to see the differences in how these groups adjust to college. Lastly, our sample does not include students enrolled in 2-year colleges and is not representative of the racial/ethnic and gender diversity of the autistic community across the United States.

How will these findings help autistic adults now or in the future?

These findings can guide colleges in choosing which resources to focus on for first-year students. Our results show that autistic students may benefit from more supports around social self-confidence during their first year of college. Mental health is another area that is important for autistic students and their success in college, and future studies should explore this topic more.

Introduction

POSTSECONDARY EDUCATION FUNCTIONS as the gateway to a host of positive adulthood outcomes, including independent living, financial independence, and better self-rated well-being.^{1,2} There are a growing number of autistic students engaging in postsecondary education.^{3,4} However, little is known about the persistence of autistic students in higher education, or factors that may affect their success and retention. Adjustment to the college context during freshman year significantly impacts first-year students’ decisions to remain enrolled in college.⁵ Adjustment spans multiple domains, including social adjustment, academic adjustment, personal/emotional adjustment (e.g., psychological well-being), and attachment to their institution (e.g., students’ identification and satisfaction with their college or university).⁶

Neurotypical (NT) college students’ adjustment is integral to their retention and college readiness.^{7,8} Higher levels of

self-confidence,⁸ social support, and interpersonal resilience in the face of competing demands are important contributors to adjustment among NT students.⁷ For autistic students, far less is known about factors that impact college adjustment. Autistic students report that their mental health status (i.e., depressive symptoms) and ability to find a supportive social network profoundly impact their college experience,^{9,10} suggesting that these factors are likely important contributors to adjustment. Self-confidence is another factor that may impact adjustment, as autistic students report lower levels of social self-esteem compared with nonautistic peers.^{11,12} The few studies that compare disabled and nondisabled students report poorer academic adjustment (i.e., self-reported grade point average, engaging less in class, failing a course) for autistic students,^{13,14} however, these studies have not controlled for key confounding sociodemographic factors (e.g., mental health, race/ethnicity). Controlling for student characteristics, autistic students are no more likely than NT peers

to drop out during their first year,¹⁵ suggesting that nonautism-related characteristics (e.g., language ability, educational background) may drive retention or dropout in this population of students.

Studies have yet to examine emotional, social, or institutional adjustment among autistic college students in comparison with samples of other disabled or NT students matched on mental health and sociodemographic characteristics. Furthermore, the predictors and factors associated with positive adjustment among autistic college students have not yet been investigated. To support the retention, success, and well-being of autistic students in college, we must understand predictors of first-year adjustment and whether the needs of autistic students are distinct from those of their peers. Using a sample of 74 self-identified autistic first-year students and demographically matched NT and attention-deficit/hyperactivity disorder (ADHD) peers, the present study investigates the following research questions and corresponding hypotheses:

- (1) How do autistic students differ from demographically matched NT and ADHD peers on college adjustment outcomes (i.e., social, personal/emotional, academic, and institutional adjustment)?
- (2) What factors are predictive of first-year adjustment outcomes for autistic students?

Hypotheses: We hypothesized that autistic students would report poorer social and emotional adjustment compared with NT-matched peers but would not significantly differ from their ADHD counterparts on these domains. Previous research shows that both autistic students and those with ADHD often face substantial mental health and social challenges in college,^{12,16} and autistic students in particular report low social self-confidence during their first year.¹¹ Autistic and nonautistic students have similar grades at the end of the first college year when matched on sociodemographic factors,¹⁵ while ADHD students often struggle academically.¹⁷ Thus, we predicted that autistic students in our sample would have more positive academic adjustment outcomes compared with peers with ADHD but would not significantly differ from their NT counterparts. Self-confidence and social support are predictors of first-year adjustment in the college student population at large,^{7,8} and therefore, we anticipated that social factors would predict adjustment outcomes for autistic students.

Methods

Participants

Our study included students from U.S. colleges and universities who completed national self-report surveys at the start and end of their freshman year. Postsecondary institutions independently distribute both The Freshman Year Survey (TFS) and the Your First College Year Survey (YFCY) to assess students' self-beliefs and feelings or expectations about college. The Higher Education Research Institute (HERI) at the University of California, Los Angeles, manages the surveys and data. The surveys are often administered in a proctored setting (e.g., during orientation), and both surveys, TFS and YFCY, are available in paper and electronic format. Both surveys were approved by the UCLA Institutional Review Board with a waiver of signed informed consent (IRB#10-001293 and IRB#10-000710, respectively).

Participants in the current study completed TFS at the start of their freshman year (during years 2012, 2014, and 2016) and the YFCY 1 year later. This study includes only those students who completed both surveys (TFS at the start of their first year and YFCY at year end).

The sample consists of $n = 222$ college freshmen, including 74 autistic students matched to (1) NT students who did not endorse a diagnosis of autism, ADHD, or learning disability and (2) students who endorse a diagnosis of ADHD. We matched students on survey year, gender, income, race/ethnicity, frequency of depressive symptoms at start of freshman year, and college selectivity (i.e., average scholastic assessment test score) using the case comparison fuzzy procedure in SPSS version 25. Students with ADHD were matched to autistic students based on all aforementioned demographic and mental health variables as well as all endorsed co-occurring diagnoses (e.g., learning disability, psychological diagnosis).

Measures

We drew survey items that assess adjustment across social, academic, personal/emotional, and institutional attachment domains from TFS and YFCY (Tables 1 and 2). Table 1 includes the number of items in each of the constructs described below and the source survey for each construct. Table 2 depicts construct means by group.

Demographics. Demographic characteristics include the following: (1) annual family income (i.e., <30k, 30k–50k, 50–100k, and >100k), (2) college selectivity, (3) gender (male/female), and (4) race/ethnicity (students of color, multiracial, or white).

Predictors of college adjustment. We included variables from the TFS as predictors. We assessed two constructs at college entry as predictors of later college adjustment outcomes: social self-confidence ($\alpha = 0.68$, range = 2–10) and intellectual self-confidence ($\alpha = 0.55$, range = 7–20). Higher scores on each reflect greater self-reported self-confidence.

Associated factors. Associated factors refer to constructs with items collected concurrently with the outcomes (YFCY). We evaluated two items as factors associated with college adjustment outcomes: (1) ease of making friends (range = 1–4) and (2) ability to balance academic and social demands (range = 1–4). Higher scores indicate greater ease of making friends and greater ability to balance academic and social demands.

College adjustment outcomes

Social. We used social self-confidence ($\alpha = 0.60$, range = 2–10) as the measure of social adjustment. Higher scores indicate higher self-rated social self-confidence.

Academic. Academic adjustment outcomes included the following: (1) intellectual self-confidence ($\alpha = 0.61$, range = 4–20) and (2) academic success (range = 2–9). Higher scores indicate greater self-reported intellectual self-confidence and higher self-reported grade point average (GPA).

Personal/emotional. We measured personal/emotional adjustment using psychological stress ($\alpha = 0.67$, range = 3–9). Higher scores indicate greater perceived stress.

TABLE 1. CONSTRUCT DETAILS

<i>Construct</i>	<i>Survey items</i>	<i>No. of items</i>	<i>Items</i>	<i>Response options</i>	<i>n (% missing)</i>	<i>Total sum score, range</i>	<i>Cronbach's alpha</i>
Predictors							
Social self-confidence	TFS	2	Rate yourself compared with the average person your age on your: (1) Self-confidence (social) (2) Leadership ability	Lowest 10%, below average, average, above average, highest 10%.	216 (2.7)	2–10	0.68
Intellectual self-confidence	TFS	4	Rate yourself compared with the average person your age on your: (1) Intellectual self-confidence (2) Academic ability (3) Mathematical ability (4) Writing ability	Lowest 10%, below average, average, above average, highest 10%.	215 (3.15)	7–20	0.55
Associated factors							
Ease of making friends	YFCY	1	Ease of making friends with other students	Very difficult, somewhat difficult, somewhat easy, very easy.	215 (3.15)	1–4	—
Balancing academic and social demands	YFCY	1	I have been able to find a balance between academics and extracurricular activities.	Strongly disagree, disagree, agree, strongly agree.	214 (3.60)	1–4	—
Adjustment outcomes							
Social self-confidence	YFCY	2	Rate yourself compared with the average person your age on your: (1) Self-confidence (social) (2) Leadership ability	Lowest 10%, below average, average, above average, highest 10%.	214 (3.60)	2–10	0.60
Academic success	YFCY	1	What is your overall grade average (as of your most recently completed academic term)?	I did not receive grades in my courses, D, C, C+, B-, B, B+, A-, A, or A+.	215 (3.15)	2–9	—
Intellectual self-confidence	YFCY	4	Rate yourself compared with the average person your age on your: (1) Intellectual self-confidence (2) Academic ability (3) Mathematical ability (4) Writing ability	Lowest 10%, below average, average, above average, highest 10%.	167 (24.8)	4–20	0.61
Psychological stress	YFCY	3	Frequency in past year of feeling: (1) Depressed (2) Lonely or homesick (3) Isolated from campus life	Not at all, occasionally, frequently.	215 (3.15)	3–9	0.67
Campus satisfaction	YFCY	3	(1) Overall sense of community among students (2) Overall college experience thus far. (3) Overall quality of instruction	Can't rate/no experience, very dissatisfied, dissatisfied, neutral, satisfied, very satisfied.	212 (4.50)	5–18	0.81
Sense of belonging	YFCY	2	(1) See myself as a part of this campus community. (2) Feel I am a member of this college.	Strongly disagree, disagree, agree, strongly agree.	211 (4.95)	2–8	0.84

TFS, The Freshman Year Survey; YFCY, Your First College Year Survey.

TABLE 2. CONSTRUCT MEANS BY GROUP

Construct	Overall, mean (SD)	ASD, mean (SD)	ADHD, mean (SD)	NT, mean (SD)
Predictors				
Social self-confidence (TFS)	6.67 (1.92)	5.58 (1.78)	7.14 (1.62)	7.03 (1.73)
Intellectual self-confidence (TFS)	14.91 (2.50)	15.25 (2.74)	14.50 (2.50)	14.78 (2.20)
Associated factors				
Ease of making friends	2.81 (0.99)	2.64 (1.01)	2.90 (1.01)	2.90 (0.93)
Balancing academic and social demands	2.84 (0.72)	2.84 (1.85)	2.69 (0.79)	2.99 (0.63)
Adjustment outcomes				
Social self-confidence (YFCY)	6.62 (1.85)	5.58 (1.78)	7.14 (1.62)	7.11 (1.72)
Academic success	6.79 (1.79)	7.13 (1.85)	6.18 (1.85)	7.03 (1.54)
Intellectual self-confidence (YFCY)	14.53 (2.62)	14.68 (2.74)	14.21 (2.77)	14.70 (2.36)
Psychological stress	5.55 (1.70)	5.91 (1.61)	5.34 (1.82)	5.26 (1.61)
Campus satisfaction	13.91 (2.67)	14.08 (2.91)	13.37 (2.65)	14.25 (2.37)
Sense of belonging	5.97 (1.42)	6.10 (1.62)	5.67 (1.41)	5.97 (1.20)

ADHD, attention-deficit/hyperactivity disorder; ASD, autism; NT, neurotypical; SD, standard deviation.

Attachment to institution. We measured attachment to one's institution using (1) campus satisfaction ($\alpha=0.81$, range = 5–18) and (2) sense of belonging ($\alpha=0.84$, range = 2–8), where higher scores on each construct indicate greater satisfaction and belonging. All adjustment outcome constructs were comprised of YFCY items.

Analyses

To confirm success of the matching procedure, we compared the autism, NT, and ADHD groups on each socio-demographic variable of interest using chi-squared tests for categorical variables (i.e., gender, race/ethnicity, income, depressive symptoms) and analysis of variance (ANOVA) for continuous variables (i.e., college selectivity).

Missingness by model ranged from 3.15% to 22.5%, with an average of 7.88%. All models except the intellectual self-confidence models had missing data below 10%. We handled missing data using listwise deletion. We applied a Bonferroni correction to account for multiple comparisons based on the number of adjustment outcomes tested ($n=6$), and alpha was set to 0.008 (0.05/6) as the cutoff for statistical significance. We used partial eta-squared (η_p^2) to evaluate effect size for all general linear models. A η_p^2 of 0.01 or greater indicates a small effect, 0.06 or greater indicates a medium effect, and 0.14 or greater indicates a large effect.¹⁸ Effect sizes for Kruskal–Wallis tests are reported using eta-squared (η^2), where 0.01 to <0.06 indicates a small effect, 0.06 to <0.14 indicates a medium effect, and ≥ 0.14 indicates a large effect.

We explored the first research question investigating group differences on adjustment outcomes using separate general linear models or, where appropriate, Kruskal–Wallis tests. We included survey year, diagnostic group, and gender as predictors in each set of analyses. In addition, when scores on outcome constructs at the beginning of freshman year were available, we included them as covariates.

To investigate predictors of college adjustment outcomes, we conducted separate general linear models for each outcome of interest. Predictors included social self-confidence, intellectual self-confidence (TFS constructs), ease of making new friends, balancing academic and social demands (YFCY constructs), and the interaction between each predictor and diagnostic group. Covariates included survey year, college

selectivity, gender, and frequency of depression at college entry. Assumptions were met for all models and were checked using normality plots and associated tests.

Results

Demographic characteristics

Diagnostic group demographic information is reported in Table 3. Groups were not significantly different on any demographic variables of interest (race/ethnicity, gender, family income, college selectivity; $p>0.008$). Among autistic students, 31.1% identified as female, 6.8% identified as students of color, and 14.9% identified as multiracial.

How do autistic students differ from NT and ADHD peers on college adjustment outcomes?

Social adjustment

Social self-confidence. Full model results for all group comparisons are reported in Table 4. Over and above the effects of covariates (i.e., gender, social self-confidence at college entry, and year of survey form), there was a significant main effect of diagnostic group on social self-confidence at year end, $F(2, 201)=37.46$, $p<0.001$, $\eta_p^2=0.27$. *Post hoc* comparisons revealed that autistic students reported significantly lower social self-confidence than NT peers ($p<0.001$) and peers with ADHD ($p<0.008$) at the end of the year.

Ease of making friends. A Kruskal–Wallis test revealed no significant differences between diagnostic groups in self-reported ease of making friends at the end of the first year ($\chi^2=3.14$, $p=0.21$, $\eta^2=0.01$). The majority of autistic students (57.5%) reported that making friends with other students was somewhat easy or very easy for them, compared with 66% of NT students and 70% of students with ADHD. Over 50% of autistic students reported interacting with close friends at their institution on a daily basis, compared with 80% of NT students and 70% of students with ADHD.

Academic adjustment

Academic success. Over and above the effects of covariates (i.e., college selectivity, gender, year of survey form), there was a significant main effect of diagnostic group on academic

TABLE 3. DEMOGRAPHIC CHARACTERISTICS OF SAMPLE BY DIAGNOSTIC GROUP

Variable	ASD	NT	ADHD	Total sample	p	Test
Sample, <i>n</i>	74	74	74	222		
Male, <i>n</i> (%)	52 (70.3)	52 (70.3)	52 (70.3)	156 (70.3)	1.000	Chi-square
Caucasian, <i>n</i> (%)	58 (78.4)	58 (78.4)	58 (78.4)	174 (78.4)	1.000	Chi-square
Family income					0.994	Chi-square
<30k, <i>n</i> (%)	18 (8.1)	18 (8.1)	16 (7.2)	52 (23.4)		
30k–50k, <i>n</i> (%)	31 (14.0)	31 (14.0)	33 (14.9)	95 (42.8)		
50k–100k, <i>n</i> (%)	9 (4.1)	9 (4.1)	7 (3.2)	25 (11.3)		
>100k, <i>n</i> (%)	16 (7.2)	16 (7.2)	18 (8.1)	50 (22.5)		
Selectivity, mean (SD)	1174.14 (111.6)	1182.99 (109.8)	1171.66 (103.9)	1176.26 (108.1)	0.800	ANOVA
Institution type						
University, <i>n</i> (%)	22 (29.7)	27 (36.5)	27 (36.5)	76 (34.2)		
4-year college, <i>n</i> (%)	52 (70.3)	47 (63.5)	47 (63.5)	146 (65.8)		
Public, <i>n</i> (%)	9 (12.2)	5 (6.8)	11 (14.9)	25 (11.3)		
Private, <i>n</i> (%)	65 (87.8)	69 (93.2)	63 (85.1)	197 (88.7)		
Residential status				<i>n</i> = 196		
Campus housing, <i>n</i> (%)	56 (83.6)	49 (73.1)	55 (88.7)	160 (81.5)		
Fraternity/sorority, <i>n</i> (%)	1 (1.5)	2 (3.0)	2 (3.2)	5 (2.6)		
At home with family, <i>n</i> (%)	9 (13.4)	12 (17.9)	5 (8.1)	26 (13.3)		
Rented apartment/home, <i>n</i> (%)	1 (1.5)	4 (6.0)	0 (0.0)	5 (2.6)		
Frequency of depression (TFS)				<i>n</i> = 222	0.969	Chi-square
Not at all, <i>n</i> (%)	26 (35.1)	26 (35.1)	28 (37.8)	80 (36.0)		
Occasionally, <i>n</i> (%)	33 (44.6)	33 (44.6)	34 (45.9)	100 (45.0)		
Frequently, <i>n</i> (%)	15 (20.3)	15 (20.3)	12 (16.2)	42 (18.9)		

“Selectivity” refers to the average scholastic assessment test score of students enrolled in their respective institutions. ANOVA, analysis of variance.

success, $F(2,204)=6.03$, $p=0.003$, $\eta_p^2=0.06$. *Post hoc* comparisons showed that autistic students reported significantly higher academic success (GPA) than their peers with ADHD ($p=0.002$). Autistic students and NT students were not significantly different in terms of reported academic success at year end ($p=0.70$).

Intellectual self-confidence. Over and above the effects of covariates (i.e., intellectual self-confidence at college entry, gender, and year of survey form), no significant main effect of diagnostic group on intellectual self-confidence was found, $F(2,166)=1.13$, $p=0.32$, $\eta_p^2=0.01$.

Personal/emotional adjustment

Psychological stress. Over and above the effects of covariates (i.e., frequency of depression at college entry, gender, and year of survey form), no significant main effect of diagnostic group on psychological stress (i.e., frequency of depression, loneliness/homesickness, feeling isolated from campus life) at the end of freshman year was found, $F(2,208)=3.88$, $p=0.02$, $\eta_p^2=0.04$.

Balancing academic and social demands. A Kruskal–Wallis test revealed no significant differences between diagnostic groups in self-rated ability to balance academic and social demands ($\chi^2=4.70$, $p=0.10$, $\eta^2=0.01$). The majority of students in each diagnostic group (autism=75.3%, NT=82.2%, ADHD=69.1%) agreed or strongly agreed that they were able to adequately balance academic and social demands across the first year. Over half of the students who strongly disagreed with that statement were those with ADHD (58.3%; $n=7$).

Attachment to institution

Sense of belonging. Over and above the effects of covariates (i.e., gender, year of survey form), there was no significant main effect of diagnostic group $F(2,205)=1.54$, $p=0.22$, $\eta_p^2=0.01$ on sense of belonging at year end.

Campus satisfaction. Over and above the effects of covariates (i.e., gender, year of survey form), there was no significant main effect of diagnostic group $F(2,206)=2.35$, $p=0.10$, $\eta_p^2=0.02$ on campus satisfaction.

What factors are predictive of first-year adjustment outcomes for autistic students?

Social adjustment

Social self-confidence. Full model details, including confidence intervals and effect sizes, can be found in Supplementary Table S1. Beginning of year social self-confidence, $F(1,186)=184.87$, $p<0.001$, $\eta_p^2=0.50$, and ease of making friends, $F(1,186)=11.91$, $p<0.001$, $\eta_p^2=0.06$, emerged as significant predictors of end-of-year social self-confidence. Higher social self-confidence at college entry and greater ease of making friends both predicted higher social self-confidence at the end of the first year. No significant interactions were found between diagnostic group and any predictors.

Academic adjustment

Intellectual self-confidence. Full model details, including confidence intervals and effect sizes, are included in Supplementary Table S2. Intellectual self-confidence at the start

TABLE 4. MODEL RESULTS FOR GROUP COMPARISONS ON EACH OUTCOME OF INTEREST

<i>End-of-year outcome</i>	<i>Model term</i>	<i>Estimate</i>	<i>t</i>	<i>F</i>	<i>p</i>	η_p^2
Social self-confidence	Diagnostic group	—	—	37.46	0.000 ^a	0.27 ^c
	Gender	—	—	12.70	0.000 ^a	0.06 ^b
	Year	—	—	0.374	0.688	0.00
	TFS social self-confidence	—	—	124.31	0.000 ^a	0.38 ^c
Academic success	Diagnostic group	—	—	6.03	0.003 ^a	0.06 ^b
	Gender	—	—	0.02	0.881	0.00
	Year	—	—	1.12	0.329	0.01
	TFS selectivity	—	—	1.25	0.265	0.00
Intellectual self-confidence	Diagnostic group	—	—	1.13	0.324	0.01
	Gender	—	—	12.78	0.000 ^a	0.07 ^b
	Year	—	—	1.35	0.248	0.00
	TFS intellectual self-confidence	—	—	78.81	0.000 ^a	0.32 ^c
Psychological stress	Diagnostic group	—	—	3.88	0.022	0.04
	Gender	—	—	14.48	0.000 ^a	0.07 ^b
	Year	—	—	1.50	0.227	0.01
	TFS frequency of depression	—	—	51.88	0.000 ^a	0.21 ^c
Sense of belonging	Diagnostic group	—	—	1.54	0.218	0.01
	Gender	—	—	0.03	0.867	0.00
	Year	—	—	1.44	0.239	0.01
	TFS frequency of depression	—	—	51.88	0.000 ^a	0.21 ^c
Campus satisfaction	Diagnostic group	—	—	2.35	0.098	0.02
	Gender	—	—	1.74	0.189	0.00
	Year	—	—	10.01	0.000 ^a	0.09 ^b
	TFS frequency of depression	—	—	51.88	0.000 ^a	0.21 ^c
Ease of making friends		3.14	—	—	0.21	0.01
Balancing academic and social demands		4.70	—	—	0.10	0.01

^a*p*-value <0.008.^bMedium effect size.^cLarge effect size.

of the year, $F(1,151)=93.64$, $p<0.001$, $\eta_p^2=0.38$, and ease of making new friends, $F(1,151)=10.79$, $p=0.001$, $\eta_p^2=0.07$, significantly predicted intellectual self-confidence at year end. Higher intellectual self-confidence predicted higher intellectual self-confidence at the end of the first year. Those who had an easier time making friends, however, had lower intellectual self-confidence at the end of the year. No significant interactions between diagnostic group and any predictors were found.

Academic success. Full model details, including confidence intervals and effect sizes, are included in Supplementary Table S3. Beginning of year intellectual self-confidence (TFS), $F(1,186)=14.14$, $p<0.001$, $\eta_p^2=0.07$, and balancing academic and social demands, $F(1,186)=10.77$, $p<0.001$, $\eta_p^2=0.06$, were significant contributors to first-year GPA. Higher intellectual self-confidence and greater ease of balancing academic and social demands were related to higher GPA at the end of the first year. No significant interactions were found between diagnostic group and any predictors.

Personal/emotional adjustment

Psychological stress. Full model details, including confidence intervals and effect sizes, are included in Supplementary Table S4. Social self-confidence, $F(1,186)=36.40$, $p<0.001$, $\eta_p^2=0.16$, balancing academic and social demands, $F(1,186)=40.08$, $p<0.001$, $\eta_p^2=0.18$, and ease of making new friends, $F(1,186)=77.71$, $p<0.001$, $\eta_p^2=0.29$, all significantly predicted psychological stress. Higher social self-confidence, greater ease of making friends, and increased

ability to balance demands predicted lower psychological stress at the end of the first year. There were no significant interactions between the diagnostic group and the predictors.

Attachment to institution

Campus sense of belonging and satisfaction. Full model details, including confidence intervals and effect sizes, are included in Supplementary Tables S5 and S6. The same predictor and associated factors were significant for campus satisfaction and campus sense of belonging. These predictors included social self-confidence (sense of belonging, $F(1,186)=12.18$, $p<0.001$, $\eta_p^2=0.06$; satisfaction $F(1,186)=11.46$, $p<0.001$, $\eta_p^2=0.06$), balancing demands (sense of belonging, $F(1,186)=47.68$, $p<0.001$, $\eta_p^2=0.20$; satisfaction, $F(1,186)=24.51$, $p<0.001$, $\eta_p^2=0.12$), and ease of making friends (sense of belonging, $F(1,186)=61.45$, $p<0.001$, $\eta_p^2=0.25$; satisfaction, $F(1,186)=52.91$, $p=0.001$, $\eta_p^2=0.22$). For both outcomes, higher social self-confidence, greater ease of making friends, and increased ability to balance demands predicted increased attachment to the institution at the end of the first year. No significant interactions were found between the diagnostic group and predictors in either model.

Discussion

The present study examined college adjustment outcomes and predictors of these outcomes among matriculated first-year autistic college students. Findings from the present study indicate that controlling for mental health and demographic factors entering college, neurodivergent and NT students in our sample were not significantly different on many

traditional indicators of successful adjustment to postsecondary education, including academic, social, personal/emotional, and institutional attachment.

More similar than different: college adjustment outcomes

Consistent with our hypotheses, autistic students in this sample who completed their freshman year are significantly more academically successful than students with ADHD and are not significantly different from their NT peers. This finding supports prior work demonstrating high academic achievement among autistic college students.^{3,4} In addition, autistic students who persisted through freshman year did not significantly differ from their NT and ADHD peers in terms of their attachment to their institution. However, we still know little about autistic students who drop out during their freshman year and the academic and administrative supports that may increase rates of retention. Few studies have investigated retention rates among autistic students,¹⁵ and many existing resources report on unrepresentative samples.¹⁹

In contrast to prior work that indicated greater psychological distress (e.g., depressive symptoms, loneliness) among autistic students,⁹ the present study found no significant differences in psychological stress between neurodivergent and NT students. The evident differences in results are likely due to the use of unmatched groups in prior work.⁹ In the context of these combined findings, the current study underscores the potential driving force of co-occurring mental health concerns on reported adverse adjustment outcomes, although future studies should examine this further.

Despite not feeling socially confident relative to their peers, the majority of autistic students report making meaningful connections with their fellow students. These results build upon previous findings that autistic postsecondary students report lower social self-confidence upon entering college,¹¹ and underscore the importance of exploring factors outside of autistic traits that may drive feelings of social competence, such as social anxiety and societal messaging about autistic social competencies.

Factors that predict first-year adjustment outcomes

Consistent with our hypotheses, we found that social factors (i.e., ease of making friends during the first year, social self-confidence at start of the year) are critically important to social, personal/emotional, and institutional adjustment outcomes for all neurodivergent and NT students. Establishing a social network in college plays a role in optimizing psychological health, retention, and satisfaction.^{20–22} Indeed, self-esteem has been linked to social integration and adjustment among NT and neurodivergent students (i.e., autistic, ADHD).^{16,23–25} It is important to note that autistic students reported significantly lower social self-confidence at the beginning and end of freshman year, pointing to the broad importance of social self-esteem for these students.^{11,26} While social factors impact students' social adjustment to college, the same social factors were not predictive of academic adjustment outcomes.

An ability to balance competing demands during the first year emerged as an equally important indicator of lower psychological stress, increased institutional attachment, and increased academic performance for both NT and neu-

rodivergent groups. Difficulty with balancing multiple demands of academics, independent living, and social life is a theme that has emerged from qualitative studies conducted with autistic students.¹⁰ Time management in particular is critical to balancing demands, and is related to greater academic success.^{27,28} Autistic students in this sample who complete their first college year are not significantly different from their NT and ADHD peers with regard to the ability to balance demands, indicating that many college students will benefit from accessible supports in this area.

Depression as a possible risk factor for poor higher education adjustment

The present study is unique in that NT and neurodivergent students were matched on levels of depression. Previous studies using unmatched groups have found differences favoring nonautistic students in GPA, sense of belonging, personal/emotional adjustment, and institutional attachment.^{13,29} In controlling for depression, our results suggest that neurodivergent and NT students do not significantly differ on many adjustment outcomes.

The incidence of depression is higher among autistic students versus nonautistic peers.^{9,30} While 9.5% of students overall indicate feeling frequently depressed, autistic students note feeling frequently depressed at over twice that rate (22.4%).³¹ Mental health, previously noted as a mediator of social, academic, and personal challenges among autistic students,³² is likely a driving contributor to difficulties that autistic students face in first-year adjustment and warrants further investigation.

Limitations

Given that there are very few studies that report on longitudinal survey data from self-identified college students, these results provide us with a meaningful foundation for future work, although conclusions must be drawn with caution for several reasons. The surveys, TFS and YFCY, were not specifically developed for use with autistic or neurodivergent populations. In addition, reliability of several constructs fell marginally below generally accepted standards ($\alpha=0.7$), likely due to the small number of items in several of the scales,³³ and some of the survey data were collected several years ago (2012). The surveys were linked to student identification number, which may have resulted in some respondent bias. In addition to limitations with the data collection instruments, the lack of significant differences between the autism, ADHD, and NT groups on adjustment outcomes may have been affected by statistical power. Importantly, only students with survey data at the start and end of freshman year were included in this study, and thus, these findings are not representative of students who dropped out during the year. We did not exclude students enrolled in 2-year colleges from the present study, but these students were not represented in the final matched sample. Given that many autistic students attend community college programs, future studies should investigate the adjustment experiences of these students in particular. Finally, generalization of these findings should be considered in the context of the sample included in this study, which is not representative of the racial/ethnic and gender diversity in the autistic community across the United States.

As a result of these limitations, these findings should be considered preliminary and explored further using other methods and designs, as detailed in the section that follows.

Future directions

Overall, this study presents the findings of a targeted secondary data analysis of existing data, and thus, there are many ways that future work can increase our depth of understanding of the adjustment experiences of first-year neurodivergent students. First, these findings should be replicated in samples that are more effectively powered to detect clinically meaningful differences between the autism, ADHD, and NT groups. In addition, qualitative and mixed-methods studies in this area will supplement our findings with important context that may elucidate other factors that are predictive of first-year outcomes. Community-based participatory designs are a particularly appropriate next step for this work, as the inclusion of autistic voices is essential to characterizing the first-year college experience and factors that impact success and well-being. Future work should examine the experiences of students who drop out during the first year and should also consider including more long-term follow-ups to look at adjustment across all 4+ years of college. To continue to elucidate the impact of mental health on the experiences of autistic college students, future studies should consider matching participants on depression in addition to other mental health characteristics, such as frequency of anxiety.

Implications for supportive programming

Results from the present study indicate the importance of support services targeting areas of need that predict first-year outcomes for autistic students, rather than more generalized approaches (e.g., social skills interventions). Many self-advocates report that general social skills programs do not consider or support autistic ways of learning or engaging socially.³⁴ Thus, instead of these approaches, postsecondary institutions could provide more ecologically meaningful support options, such as disability support groups, peer mentoring programs, self-advocacy training, and leadership development.³⁵ Socially supportive programming that is developed in partnership with autistic students can provide a model for future work in this area.³⁶ In addition to support around social self-confidence, our results suggest that mental health status at the start of college may drive differences in adjustment and success outcomes for autistic students. Thus, future work should explore the mental health programming preferences of autistic students, and how to deliver these supports early on in college.

Authorship Confirmation Statement

L.M.B. conceived of the study, participated in its design and coordination, performed statistical analysis and interpretation of the data, and drafted the article; M.P. participated in study design and coordination, performed statistical analysis and interpretation of the data, and helped draft the article; C.K. participated in study design and coordination and revised the article; A.S. conceived of the study, participated in its design and coordination, participated in interpretation of the data, and helped draft the article. All authors read and

approved the final article before submission. The article has been submitted solely to this journal and is not published, in press, or submitted elsewhere.

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Author Disclosure Statement

No competing financial interests exist.

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Supplementary Material

Supplementary Table S1
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References

1. Roux AM, Shattuck PT, Rast JE, Rava JA, Anderson KA. *National Autism Indicators Report: Transition into Young Adulthood*. Philadelphia, PA: Life Course Outcomes Research Program, A.J. Drexel Autism Institute, Drexel University; 2015.
2. Sanford C, Newman L, Wagner M, Cameto R, Knokey A-M, Shaver D. *The Post-High School Outcomes of Young Adults with Disabilities up to 6 Years After High School. Key Findings from the National Longitudinal Transition Study-2 (NLTS2)*. Menlo Park, CA: SRI International; 2009;106.
3. Cox BE, Thompson K, Anderson A, et al. College experiences for students with autism spectrum disorder: Personal identity, public disclosure, and institutional support. *J Coll Stud Dev*. 2017;58(1):71–87.
4. VanBergeijk E, Klin A, Volkmar F. Supporting more able students on the autism spectrum: College and beyond. *J Autism Dev Disord*. 2008;38(7):1359–1370.
5. Haktanir A, Watson JC, Ermis-Demirtas H, et al. Resilience, academic self-concept, and college adjustment among first-year students. *J Coll Stud Retent Res Theory Pract*. 2018;23(1):161–178.
6. Baker R, Siryk B. *SACQ: Student Adaptation to College Questionnaire Manual*. Los Angeles, CA: Western Psychological Services; 1999.

7. Hartley MT. Examining the relationships between resilience, mental health, and academic persistence in undergraduate college students. *J Am Coll Health*. 2011;59(7):596–604.
8. Sedlacek WE. Using noncognitive variables in assessing readiness for higher education. *Read Equal Educ*. 2011;25:187–205.
9. Jackson SLJ, Hart L, Brown JT, Volkmar FR. Brief report: Self-reported academic, social, and mental health experiences of post-secondary students with autism spectrum disorder. *J Autism Dev Disord*. 2018;48(3):643–650.
10. Van Hees V, Moyson T, Roeyers H. Higher education experiences of students with autism spectrum disorder: Challenges, benefits and support needs. *J Autism Dev Disord*. 2015;45(6):1673–1688.
11. Sturm A, Kasari C. Academic and psychosocial characteristics of incoming college freshmen with autism spectrum disorder: The role of comorbidity and gender. *Autism Res*. 2019;12(6):931–940.
12. Fernandes P, Haley M, Eagan K, Shattuck PT, Kuo AA. Health needs and college readiness in autistic students: The freshman survey results. *J Autism Dev Disord*. 2021 [Online ahead of print], DOI: 10.1007/s10803-020-04814-8.
13. McLeod JD, Meanwell E, Hawbaker A. The experiences of college students on the autism spectrum: A comparison to their neurotypical peers. *J Autism Dev Disord*. 2019;49(6):2320–2336.
14. Trevisan D, Birmingham E. Examining the relationship between autistic traits and college adjustment. *Autism*. 2016;20(6):719–729.
15. Bakker TC, Krabbendam L, Bhulai S, Begeer S. First-year progression and retention of autistic students in higher education: A propensity score-weighted population study. *Autism Adulthood*. 2020;2(4):aut.2019.0053.
16. Shaw-Zirt B, Popali-Lehane L, Chaplin W, Bergman A. Adjustment, social skills, and self-esteem in college students with symptoms of ADHD. *J Atten Disord*. 2005;8(3):109–120.
17. DuPaul GJ, Gormley MJ, Anastopoulos AD, et al. Academic trajectories of college students with and without ADHD: Predictors of four-year outcomes. *J Clin Child Adolesc Psychol*. 2021:1–16.
18. Richardson JTE. Eta squared and partial eta squared as measures of effect size in educational research. *Educ Res Rev*. 2011;6(2):135–147.
19. Wei X, Christiano ERA, Yu JW, Blackorby J, Shattuck P, Newman LA. Postsecondary pathways and persistence for STEM versus non-STEM majors: Among college students with an autism spectrum disorder. *J Autism Dev Disord*. 2014;44(5):1159–1167.
20. Hefner J, Eisenberg D. Social support and mental health among college students. *Am J Orthopsychiatry*. 2009;79(4):491–499.
21. Nicpon MF, Huser L, Blanks EH, Sollenberger S, Befort C, Kurpius SER. The relationship of loneliness and social support with college freshmen's academic performance and persistence. *J Coll Stud Retent Res Theory Pract*. 2006;8(3):345–358.
22. Gerdes H, Mallinckrodt B. Emotional, social, and academic adjustment of college students: A longitudinal study of retention. *J Couns Dev*. 1994;72(3):281–288.
23. Herrero J, Gracia E. Predicting social integration in the community among college students. *J Community Psychol*. 2004;32(6):707–720.
24. Friedlander LJ, Reid GJ, Shupak N, Cribbie R. Social support, self-esteem, and stress as predictors of adjustment to university among first-year undergraduates. *J Coll Stud Dev*. 2007;48(3):259–274.
25. Slomkowski C, Klein R, Mannuzza S. Is self-esteem an important outcome in hyperactive children? *J Abnorm Child Psychol*. 1995;23:303–315.
26. Williamson S, Craig J, Slinger R. Exploring the relationship between measures of self-esteem and psychological adjustment among adolescents with Asperger Syndrome. *Autism*. 2008;12(4):391–402.
27. Britton B, Tesser A. Effects of time-management practices on college grades. *J Educ Psychol*. 1991;83:405–410.
28. Macan TH, Shahani C, Dipboye RL, Phillips AP. College students' time management: Correlations with academic performance and stress. *J Educ Psychol*. 1990;82(4):760–768.
29. Adams KS, Proctor BE. Adaptation to college for students with and without disabilities: Group differences and predictors. *J Postsec Educ Disabil*. 2010;22(3):166–184.
30. Anderson AH, Carter M, Stephenson J. Perspectives of university students with autism spectrum disorder. *J Autism Dev Disord*. 2018;48(3):651–665.
31. Eagan K, Stolzenberg EB, Ramirez JJ, Aragon MC, Surchard MR, Hurtado S. *The American Freshman: National Norms Fall 2014*. Los Angeles, CA: Higher Education Research Institute, UCLA; 2014.
32. Chiang H-L, Gau SS-F. Comorbid psychiatric conditions as mediators to predict later social adjustment in youths with autism spectrum disorder. *J Child Psychol Psychiatry*. 2016;57(1):103–111.
33. Nunnally JC. *Psychometric Theory*. New York, NY: McGraw-Hill; 1978.
34. McLaren KR. *Autism Social Skills Training at the Margins of a Social Fiction*. 2014. <https://scholarworks.calstate.edu/concern/theses/mw22v614> (accessed July 10, 2021).
35. Sarrett JC. Autism and accommodations in higher education: Insights from the autism community. *J Autism Dev Disord*. 2018;48(3):679–693.
36. Gillespie-Lynch K, Bublitz D, Donachie A, Wong V, Brooks PJ, D'Onofrio J. "For a long time our voices have been hushed": Using student perspectives to develop supports for neurodiverse college students. *Front Psychol*. 2017;8:544.

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