


Supporting university students with autism spectrum disorder

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Abstract

Increasing numbers of students with autism spectrum disorder are entering higher education. Their success can be jeopardized by organizational, social/emotional, and academic challenges if appropriate supports are not in place. Our objective was to evaluate the effectiveness of a support group model for university students with autism spectrum disorder in improving psychological and functional outcomes. A curriculum guided the weekly discussions and consisted of topics such as time and stress management, managing group work, and social communication. Efficacy was assessed through pre- and post self-report measures focused on self-esteem, loneliness, anxiety, and depression. Functional changes in academic and social skills were examined through qualitative analysis of focus groups. Findings from the self-report measures indicated significant reductions in feelings of loneliness and general anxiety, and a significant increase in self-esteem at the end of the program compared to the beginning. Five prominent themes were identified in the focus-group analysis and reflected how the program had positively impacted participants' skills and coping: executive functioning; goal setting; academics and resources; stress and anxiety; and social. Given the cost effectiveness of "in-house" interventions and the potential for improving academic outcomes and retention of students with autism spectrum disorder, further research examining similar program models is warranted.

Keywords

adults, autism spectrum disorders, education services, interventions—psychosocial/behavioral, qualitative research

With the current influx of individuals with autism spectrum disorder (ASD) reaching adulthood, outcomes for this population is of increasing concern (Engstrom et al., 2003; Howlin et al., 2004; VanBergeijk et al., 2008). Current data suggest that ASD affects 1 in every 68 children (Centers for Disease and Control Prevention (CDC), 2014) and is characterized by significant impairments in social interaction and communication skills, repetitive behaviors, and highly restricted activities and interests (American Psychiatric Association, 2013). While considerable effort has been invested in improving service provision for autistic¹ children, post high-school graduation outcomes remain bleak. Quality of life is lower among those with ASD compared to those without ASD across children, adolescents, adults, and the elderly (Van Heijst and Geurts, 2015). Difficulties finding employment (Shattuck et al., 2012; Taylor and Seltzer, 2011), social isolation (Howlin et al., 2013), and lack of independent living (Billstedt et al., 2005; Howlin et al., 2004) are typical.

While growing numbers of young adults with ASD are continuing to higher education, this number is lower than individuals with other types of disabilities such as those

with speech/language, hearing, or visual impairments (Newman et al., 2011). Preparing for this influx is a challenge for colleges and universities, and autistic students are not yet receiving adequate social or educational support in higher education (Cai and Richdale, 2016). Data from the National Longitudinal Transition Study-2 (NLTS2) indicates that of students with ASD attending 2-year colleges, less than half of those who disclosed their disability reported receiving any services or accommodations (Roux et al., 2015). Many autistic individuals can cope with the intellectual demands of college but struggle with a broad range of other challenges that are critical to success including communication challenges, executive functioning skills, low self-esteem, maintaining motivation for school, emotion modulation, self-advocacy, and

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sensory overload (e.g. Alverson et al., 2015; Madriaga and Goodley, 2010; Trembath et al., 2012; Van Hees et al., 2015; White et al., 2016b). Comorbid psychopathology, such as high levels of stress and anxiety, can also interfere with academic success (Glennon, 2001; Van Hees et al., 2015). The gap between the demands of high school and those experienced in college, including adjusting to changes in routine, a sporadic class schedule, and greater independence, self-autonomy, and self-advocacy, can be particularly problematic (Van Hees et al., 2015). Those who reside at the university may also have to negotiate with roommates, handle meals, laundry, and other daily living skills.

Cai and Richdale (2016) conducted focus groups with students with ASD and family members to examine their experiences and support needs in a college setting. Students themselves generally felt they received adequate educational support but not social support. Parents felt their son/daughter did not receive adequate support in either area. Inherent in campus life are numerous situations which demand complex social skills such as navigating appropriate classroom behavior, group discussions, and group assignments (Cullen, 2015), as well as connecting socially with other students. Many students with ASD experience feelings of loneliness (Madriaga and Goodley, 2010; Van Hees et al., 2015) which may contribute to dropping out. In fact, students with disabilities are less likely than their typically developing peers to graduate from a post-secondary program (41% vs 52%), and autistic young adults are even less likely (39%) (Newman et al., 2011).

Compounding the problems experienced by autistic students on campus is the lack of knowledge and understanding of ASD among faculty and staff (Glennon, 2016; Tipton and Blacher, 2014), as well as peers (Gillespie-Lynch, et al., 2015). Meeting others and integrating socially on campus is key to success in university (Cullen, 2015). While students may be willing to have more distant relationships with those with ASD such as living in the same building, they are less willing to hang out with them (Gardiner and Iarocci, 2014). Even students who are knowledgeable about ASD report negative attitudes toward participating in university and classroom-based activities with students with ASD (White et al., 2016a). Although awareness of someone's diagnosis may improve attitudes towards an individual (Matthews et al., 2015). Facilitating the integration of students with ASD into campus social life may also improve peer attitudes and reduce isolation.

White et al. (2016b) conducted an online survey and focus groups with autistic students, parents, and educators/support staff where again social difficulties were identified as central to their support needs. Social skills groups, despite empirical support with younger populations, are not typically implemented with college-age students (VanBergeijk et al., 2008). Students themselves have expressed desire for support groups where they can meet other autistic students, share experiences, and

discuss problem-solving strategies (Van Hees et al., 2015). Smith (2007) surveyed Disability Services Offices from 29 higher education institutions. None of them provided support group services and the accommodations provided were not tailored to the specific needs of students with ASD. More recently, Barnhill (2016) found that 15 of the 30 colleges/universities surveyed provided a social skills group for their students with ASD. While many schools reported benefits of social skills training, some cited concerns that students were not receptive to the group, did not show up at the expected time, or that breaking down social skills was not helpful. Offering a broader curriculum with emphasis on academic skills, time management, and managing stress and anxiety may have more appeal.

There is an apparent need for services universities can implement inexpensively and effectively which improve retention and success for students with ASD (Barnhill, 2016). While an increasing number of institutions are conducting support groups, mentoring programs, special tutoring, and other additional supports, there remains a lack of empirical support for these activities, or an understanding of what supports are most helpful for autistic students (Cox et al., 2017; Langford-Von Glahn et al., 2008). A recent systematic review of the literature revealed a lack of evidence-based interventions specifically designed for university students with ASD (Gelbar et al., 2014). This study aimed to fill that gap by evaluating the effectiveness of a support group model for university students with ASD. Similar work with neurotypical first-year students has indicated positive outcomes. For example, Mattanah et al. (2010) found that those who participated in peer-led support groups reported increased feelings of adjustment; however, to our knowledge, results from this type of intervention have not yet been reported for those with ASD. Through participation in the support group, we anticipated that participants would feel less lonely, anxious, and depressed, and that they may increase their self-esteem as they developed connections with others and gained useful strategies and tools to aid their success as a student. Although previous work has supported the use of self-report measures among those on the autism spectrum (Hesselmark et al., 2015), to add further clarity and depth, we also collected qualitative data from focus groups. The focus groups allowed examination of functional changes in academic and social skills, and hearing directly from students themselves, a notable gap in the current literature focused on higher education students with ASD (Cox et al., 2017; Gelbar et al., 2014). We also assessed the program's social validity—that it was acceptable, socially relevant, and useful to the participants. In general, autistic college students make their own decisions regarding interventions and services they are willing to receive. Therefore, considering the social validity of the program is important for assessing impact and for ensuring program longevity.

Methods

Program participants

Program participants were 52 university students registered with Student Disability Services (SDS). There were 51 males and 1 female. The average age was 20.9 years with a range from 18 to 28 years. In total, 4 participants identified as Hispanic, 2 as Asian, 1 as African American, and 45 as Caucasian. All participants provided documentation of an ASD diagnosis prior to their eligibility for SDS services: typically a neuropsychological report although in some cases a psychological verification letter from a licensed provider. All students with ASD were informed of the program when they registered with SDS, and staff followed up with those who expressed an interest. Participants took part in the “Connections” program in nine separate cohorts over a period of 6 years. Depending on the cohort, the program served between 9% and 25% of students with ASD registered with Disability Services at the university. Not all of the 52 participants chose to complete the measures or participate in the focus groups. Also, 10 participants were excluded because they only completed the pre- and not the post-measures. This resulted in pre- and post-data for 25 or 26 participants depending on the measure.

Program model

Groups met for 1 h a week for a 7-week period and ranged in size from four to seven. Psychology Department faculty, staff from the University Counseling Center, and staff from SDS collaborated to design the curriculum and facilitate the groups. The group provided an opportunity for participants to meet other students with ASD and to receive additional information around a curriculum addressing common challenges seen among autistic students in a university setting. Topics were chosen based on challenges reported in the existing literature and our own work with students with ASD and included social life on campus, academic skills, managing group work, and time and stress management (see Table 1 for curriculum). Each week followed the same structure: 5 min free chat between group members; 10 min “check in” (assessed progress on goals (homework) for that week); 30 min for that week’s topic; 10 min for questions; and 5 min review, discuss plans for the week, and set goals (homework) for that week. To facilitate generalization, participants were encouraged to set very specific, observable weekly goals focused on the next topic.

Measures

Self-report questionnaires were completed at the beginning (time point 1) and end (time point 2) of the Connections program for each of the nine separate groups.

The measures were completed in a quiet room and took around 30 min: (1) the Rosenberg Self-Esteem Scale (SES; Rosenberg, 1989) which consists of 10 statements answered on a four-point scale from strongly agree to strongly disagree. Examples of items are as follows: “I have a number of good qualities”; “Overall I feel that I am a failure”; and “Mostly I am satisfied with who I am.” Reliability on the SES is high with test–retest correlations typically in the range of 0.82–0.88; (2) the UCLA Loneliness Scale (Russell, 1996) which consists of 10 questions rated from 1 (never) to 4 (always). Examples of items are as follows: “How often do you feel that you are ‘in tune’ with the people around you?”; “How often do you feel that you lack companionship?”; and “How often do you feel that there is no-one you can turn to?” The UCLA has shown good internal consistency (ranging from 0.89 to 0.94) and test–retest reliability over the period of 1 year ($r = 0.73$); and (3) the Counseling Center Assessment of Psychological Symptoms-34 Scale (Center for Collegiate Mental Health, 2010). We included four of the seven subscales in our analysis: depression, generalized anxiety, social anxiety, and academic distress. Example items include the following: “I am shy around others”; “My heart races for no good reason”; and “I don’t enjoy being around people as much as I used to.” Test–retest reliability has yielded coefficients ranging from 0.76 to 0.82 for the various subtests.

We also examined the social validity of the program—that it was acceptable, socially relevant, and useful to the participants, through a brief questionnaire completed at the end of the program. Participants rated on a four-point scale how much they had enjoyed the program (1 = not enjoyed, 4 = enjoyed very much), whether they had made friends in the group (yes/no), and whether or not they would recommend the program to others (yes/no).

Functional changes were examined through qualitative analysis of focus groups at the end of the program for seven of the nine cohorts ($n = 26$). The focus groups were conducted by a collaborator who did not have direct involvement with the program and who had not previously met the participants. Participants were asked six questions relating to their experiences as a university student, and the impact of the program itself on academic behaviors and social skills (see Appendix 1). Focus groups varied from three to five participants, lasted from 45 to 75 min and were recorded using a voice recorder. All aspects of the data collection were performed in accordance with the Institutional Review Board of (University of Massachusetts Lowell) (protocol no. 12-082).

Data analysis

Statistical analysis was completed using SPSS Version 22. Average scores on the self-report measures were compared between time point 1 (beginning of program) and

Table 1. Connections program curriculum.

Main topic	Session description	Goals of session
Week 1: Introductions	Introduce the program, purpose of the group; ASD and what ASD means to them; discuss what group members want to get out of the program; review curriculum; ice-breaker activity; establish ground rules; discuss the importance of goal setting, and encourage them to set a weekly specific and observable goal to work on.	<ol style="list-style-type: none"> 1. Understand the design and goals of the program. 2. Get to know each other. 3. Establish an informal, collaborative atmosphere for the program.
Week 2: Academic skills	Share studying tips, how to communicate with professors, accessing university resources; set observable weekly goal relevant to the next week's topic as homework.	<ol style="list-style-type: none"> 1. Develop a greater repertoire of study strategies. 2. Increase knowledge of supports available on campus. 3. Build rapport and trust between group members.
Week 3: Interpersonal communication and relationships	Meeting people: opportunities on campus? Small talk, making friends. Social interaction as support system on campus and at work. Discussion of dating. Set observable weekly goal relevant to the next week's topic as homework.	<ol style="list-style-type: none"> 1. Develop additional ideas for meeting others on campus. 2. Identify barriers to becoming more integrated on campus. 3. Discuss friendships and close relationships.
Week 4: Working in groups	Working in groups. Role play group-discussion activity: identify certain behaviors they engaged in while in the group; discuss issues surrounding how to make group work successful: choosing a group, having a voice, negotiating roles, dominating the group, holding back, listening to others. Set observable weekly goal relevant to the next week's topic as homework.	<ol style="list-style-type: none"> 1. Increase understanding of how to make group work successful. 2. Understand how they act in a group and how this impacts the group members. 3. Troubleshoot common problems that arise during group work.
Week 5: Future plans	Summer job search strategies, internships, interviews, future plans. Guest speaker from Careers Services. Set observable weekly goal relevant to the next week's topic as homework.	<ol style="list-style-type: none"> 1. Recognize the amount of work that goes into finding a job. 2. Understand the importance of gaining experience while still a student. 3. Begin thinking about post-graduation plans.
Week 6: Time and stress management	Time management, organizing and managing workload, avoiding procrastination, planning ahead. Stress management, relaxation techniques, breathing exercises. Strategies/resources: sleep, exercise, music, deep/cleansing breathing, audio downloads, visual guided imagery, university stress helpline. Set observable weekly goal relevant to the next week's topic as homework.	<ol style="list-style-type: none"> 1. Recognize the importance of time management for academic success. 2. Identify impairments and problems caused by stress and anxiety. 3. Practice some relaxation techniques that can be utilized at home.
Week 7: Bringing it all together	Review material covered and discussions from the program.	<ol style="list-style-type: none"> 1. Reflect on topics covered, and what has been learned. 2. Plan how to continue applying group ideas and material beyond the program. 3. Consider how to keep in touch with fellow group members.

ASD: autism spectrum disorder.

time point 2 (end of program) using related t-tests. Results from the social validity questionnaire were examined using average and frequency scores. For the focus groups, verbatim transcriptions were initially reviewed in their entirety by two coders to identify themes (“nodes”) within the data across the seven groups. Overarching themes were created by grouping comments which were related to one another and identifying a label broad enough to capture the majority of comments which fit in

that category. Themes with only a small number of comments, or which students spent minimal time discussing, were either removed or collapsed into other themes, resulting in five final themes. Subsequently, coders independently coded the entire transcription for the three most recent focus groups using NVivo software. Interrater reliability for coding to nodes was achieved with Cohen’s Kappa of 0.82 which is considered a “substantial” agreement (Landis and Koch, 1977).

Table 2. Psychological outcomes: pre- and post self-report questionnaires.

Measure	Average score, pre	Average score, post	t	p
Rosenberg Self-Esteem Questionnaire	30.35	32.0	t(25) = -3.80	0.001
UCLA Loneliness Scale	46.31	42.85	t(25) = 2.744	0.011
Counseling Center Assessment of Psychological Symptoms-32				
Depression	5.40	5.32	t(24) = 0.098	0.923
General Anxiety	8.51	7.24	t(24) = 2.22	0.036
Social Anxiety	9.84	8.36	t(24) = 1.93	0.065
Academic Distress	5.56	5.66	t(24) = -0.13	0.90

Results

Psychological outcomes (self-report questionnaires)

Participants showed significantly higher self-esteem, reduced loneliness, and lower generalized anxiety at the end of the program compared to the beginning. Subscales examining social anxiety, academic distress, and depression did not show a significant difference. Table 2 summarizes these findings.

Social validity

The average rating across participants for how much they had enjoyed the program was 3.05 (1 = not enjoyed, 4 = enjoyed very much). A total of 21 participants indicated they had made friends in the group (85%). In total, 21 said they would recommend the program to others and 2 said they would not recommend the program.

Qualitative analysis

Two coders reviewed the transcriptions from the seven focus groups and identified five prominent themes (“nodes”):

1. *Stress and anxiety.* Mentions the Connections program helped to reduce or learn how to cope with stress and anxiety.
2. *Executive functioning.* Mentions how Connections helped improve executive functioning skills including time management, organizing, and scheduling.
3. *Goal setting.* Mentions how Connections helped them set and/or achieve goals.
4. *Academics and resources.* Mentions how Connections helped improve academic skills including study tips, improving grades, communicating with professors, accessing university resources such as advising and tutoring, improved knowledge of workings of the university.
5. *Social.* Mentions how Connections helped them interact with other students (inside and outside of

the group) more frequently and more effectively, helped find solutions to campus living issues.

Theme 1: stress and anxiety. Anxiety is frequently comorbid with ASD and can impact all areas of life for a college student. Finding ways to reduce stress and anxiety among this population is of significance. This was a prominent theme in our focus-group analysis where participants frequently mentioned the group helped to reduce feelings of anxiety or that they had learned strategies to cope with stress and anxiety. For example,

Some of the stress relieving abilities have helped me calm down and such when dealing with these particularly bad grades.

It just kind of helped, like if I had any concerns that I had to voice about, maybe some stress I was having on some projects, maybe just like get it out there. Almost like a sounding board, the feedback helped me also solve the problem, too.

Theme 2: executive functioning. Many autistic individuals struggle with executive functioning skills. For university students, difficulty keeping class notes and materials organized, tracking deadlines, and managing time effectively can jeopardize success regardless of aptitude for the academic content. We asked participants whether Connections had influenced how they handle their academic work. Executive functioning skills were frequently mentioned, such as

It's helped with ... help me think about time management. Because it's been one of my things, too. I never really had good time management. So you know, I've been more aware of it. It's made me think about it. Like I have to budget it.

Like I said it all goes back to the time management. Making sure I'm at this place at this certain time. I'm at my classes at this certain time, make sure I have this, this, this, and this done at a certain time. All of this can be related to Connections because it actually helped me with my study habits. It also helped me with my habits in life in general.

Theme 3: goal setting. Goal setting was a common theme in response to a number of questions asked during the focus

groups. Goal setting was particularly emphasized in the curriculum, so perhaps, this is not surprising. Examples of comments related to this are:

I liked setting the goals even if I didn't think of it all the time. I would at least go out of here thinking this is what I need to do this week ...

I am more prone to consciously reminding myself of the things I need to do then following up on them.

Theme 4: academics and resources. Participants mentioned a range of benefits related to improved academic skills and greater knowledge of the university and resources available on campus. This topic was focused on during week 2 of the curriculum, and resonated with the participants:

Well, in the Connections group there are people from Psychology, disabilities, and things like that. And there's so many people, it was easier to find help. For health issues, or academic issues, like easier to connect within the university and services they have to offer.

I got some good tips about studying that I hadn't bothered to use before, and I've been using them now and things are easier.

Theme 5: social. Week 3 of the curriculum focused on interpersonal communication and relationships, and comments related to improvement in social skills, greater willingness to interact with other students, and solving interpersonal problems. For example,

Well I figured out, I didn't know this before, but I figured out how to change my social skills and little bit and pieces that I didn't know were actually very negative.

For the first time in my life, my friends from group and I went to [coffee shop], which I guess is something we all got to do, right? So I guess what I can say is I've had good opportunities from this group to practice good social skills and how to apply them elsewhere.

Other comments related to the benefits of meeting others in the group, for example,

I think it just makes me feel better, just knowing there's people out there just like me trying to just find myself. Trying to find who I am. Trying to figure out my identity. Even with the ASD, the spectrum disorder, knowing that I can pretty much do anything that anyone else can. I just have a back-up system. I know I have people to talk to and people that I can ask for support.

Program feedback

During the focus group, participants commented on how the program could be improved. They most frequently

mentioned difficulty adjusting schedules in order to attend, having to wait for the group to begin, making the sessions less structured with more time to socialize, not requiring homework, making the program longer, and having larger groups.

Academic outcomes

Of the 52 participants, 41 have either successfully graduated or are still enrolled, 2 dropped out, 1 transferred, 1 is deceased, and the status of the remainder ($n = 7$) is unclear (still registered as a student but not currently enrolled in classes).

Discussion

With the growing pressure in higher education to support autistic students, efficient and effective interventions are needed to ensure success. While more universities are providing services, few are designed specifically for the needs of those with ASD and those who lack empirical evaluation (Barnhill, 2016; Smith, 2007). To address this need, we implemented a support group for university students with ASD designed to address common challenges including social life on campus, academic skills, managing group work, and time and stress management. Our findings indicate that a relatively easily implemented program can have a significant impact on outcomes, and that participants reported the program as worthwhile. Specifically, participants showed significantly higher self-esteem, reduced loneliness, and lower anxiety at the end of the program compared to the beginning. However, subscales examining social anxiety, academic distress, and depression did not show a significant difference.

We would expect the program to reduce loneliness as participants were able to meet and make connections with other students. Some of our participants specifically mentioned how meeting other autistic students had been beneficial, which has been noted in previous work (Van Hees et al., 2015). Person-centered planning (PCP) is widely embraced as best practice for service provision for individuals with disabilities. Inherent in the philosophy of PCP is the centrality of the individuals' preferences and priorities regarding intervention efforts (O'Brien and O'Brien, 2006; Robertson et al., 2005). Some autistic students may be content with relatively infrequent social contact, or be more likely to form relationships with neurotypical individuals, not necessarily others with ASD. Seeking and listening to the voices of those with ASD is key, particularly in helping guide intervention efforts, and is notably lacking in the current literature (Browning et al., 2009; Cox et al., 2017; Gelbar et al., 2014).

Increasing self-esteem and reducing general anxiety might reflect participants feeling more competent as a student and better able to solve problems. Not finding significant change in social anxiety is perhaps not surprising

given how pervasive this can be, and while the Connections curriculum covered issues surrounding social interactions and relationships on campus, the main focus was on challenges faced specifically in a university environment. We had hoped for improvement on depression and academic distress subscales and perhaps if the program was longer, greater improvement would be seen. Changes in general anxiety are particularly pertinent as this is frequently reported by autistic students as a major problem that impairs ability to manage many other aspects of university life (Glennon, 2001; Van Hees et al., 2015).

Feedback from participants was positive. Ensuring program validity from the participants' perspective is crucial for confirming the appropriateness of the program model, curriculum, and session activities, as well as for the longevity of the program. Previous work has shown that students are often receptive to support groups, and even suggest this approach as a useful support strategy (Van Hees et al., 2015), but if groups focus specifically on social skills, students may be less willing to attend as, after years of social skills training, they no longer find this approach helpful (Barnhill, 2016). In addition, universal design strategies may be more tolerable to students with ASD and reach a wider population of students. Creating inclusive settings such as comprehensive orientation programs offered to all students, or freshmen seminars which support the needs of those with ASD and the larger student body, is ideal (Hart et al., 2010). Universal design strategies within classes are being more widely implemented including flexible teaching approaches, digitally accessible materials, and intuitive grading rubrics and syllabi (McGuire and Scott, 2006; UDI Online Project, 2009). Computer-based interventions also provide cost-effective, individualized programming and show promise with university students with ASD (White et al., 2016c). These could include specialized programs, or apps, personal digital assistants, and electronic organizers which might be utilized by any student (Hart et al., 2010). Specialized programming, such as Connections, can be offered if natural supports and universal design strategies are inadequate for ensuring success.

The themes identified in the qualitative analysis indicated that participants felt they engaged in behaviors that would support their success as a student, such as implementing strategies to reduce stress and anxiety, improving executive functioning skills, learning how to set and meet appropriate goals, improving academic-related skills such as how to study, understanding how to access resources and supports on campus, and improving social understanding and skills. This reflects previous work indicating these areas as challenging for students with ASD (Alverson et al., 2015; Madriaga and Goodley, 2010; Van Hees et al., 2015), so it is significant that participants mentioned these as areas of improvement following the group intervention. In addition, most of these skills could be considered as

preliminary skills which have a successive impact on other areas of functioning.

One challenge we faced in evaluating the program was the number of participants who were unwilling to complete both the pre- and post-questionnaires. While 52 students took part in the group, only 25 or 26 completed both the pre- and post-measures and only 26 participated in the focus groups. In the future, more detailed explanation as to the importance of the measures could be shared with participants (without coercion), and perhaps an incentive could be offered. Another challenge was recruitment into the group. One group ended up with only four students where we hoped to recruit six to seven students for each group. This speaks to the desire among those with ASD to be as independent as possible upon completing high school, and a reluctance to disclose their disability or receive special services (Cai and Richdale, 2016). It would also be beneficial to include a control group of matched students who do not participate in the program in order to compare responses on the self-report measures. We also did not record whether students lived on campus or at home. This would be important information for future studies as those with greater continuity in support structures may experience different outcomes compared to those who move on campus (Wolf et al., 2009). Tracking long-term outcomes, such as academic performance and retention, would be another important next step. While only two participants had dropped out of the university, a significant proportion was still progressing through their academic programs at the point of data analysis, so outcomes cannot be assessed overall. Greater emphasis on post-graduation outcomes and preparing for employment while still in college is also an important area for future research (Gilson and Carter, 2016).

To our knowledge, this article is the first to report on a support group approach for university students with ASD. The wide gap that exists in service provision necessitates the identification of strategies and models that work for autistic college students (Gelbar et al., 2014; Langford-Von Glahn et al., 2008; Nevill and White, 2011). Undoubtedly, there are numerous, as yet unreported, efforts underway, but it remains the case that many higher education institutions are not currently in a position to provide additional supports for students with autism. In sum, we hope our model might be helpful to those planning a similar program that can be implemented with relatively few resources and yield positive outcomes for university students with ASD.

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Note

1. This article uses both identity-first (autistic) and person-first (person with autism) language in recognition of the dichotomous preference among different stakeholders.

References

- Alverson CY, Lindstrom LE and Hirano KA (2015) High school to college: transition experiences of young adults with autism. *Focus on Autism and Other Developmental Disabilities*. Epub ahead of print 16 October. DOI: 10.1177/1088357615611880.
- American Psychiatric Association (2013) *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Arlington, VA: American Psychiatric Publishing.
- Barnhill GP (2016) Supporting students with Asperger Syndrome on college campuses: Current practices. *Focus on Autism and Other Developmental Disabilities* 31: 3–15.
- Billstedt E, Gillberg C and Gillberg C (2005) Autism after adolescence: population-based 13- to 22-year follow-up study of 120 individuals with autism diagnosed in childhood. *Journal of Autism and Developmental Disorders* 35(3): 351–360.
- Browning J, Osborne LA and Reed P (2009) A qualitative comparison of perceived stress and coping in adolescents with and without autistic spectrum disorders as they approach leaving school. *British Journal of Special Education* 36(1): 36–43.
- Cai RY and Richdale AL (2016) Educational experiences and needs of higher education students with autism spectrum disorder. *Journal of Autism and Developmental Disorders* 46: 31–41.
- Center for Collegiate Mental Health (2010) *CCAPS 2010 User Manual*. University Park, PA: Center for Collegiate Mental Health.
- Centers for Disease and Control Prevention (CDC) (2014) Prevalence of autism spectrum disorder among children aged 8 years - Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2010. *MMWR Surveillance Summaries* 63: 1–21.
- Cox BE, Thompson K, Anderson A, et al. (2017) College experiences for students with Autism Spectrum Disorder (ASD): Personal identity, public disclosure, and institutional support. *Journal of College Student Development* 58(1): 71–87.
- Cullen JA (2015) The needs of college students with autism spectrum disorders and Asperger's syndrome. *Journal of Postsecondary Education and Disability* 28(1): 89–101.
- Engstrom I, Ekstrom L and Emilsson B (2003) Psychosocial functioning in a group of Swedish adults with Asperger syndrome or high functioning autism. *Autism* 7(1): 99–110.
- Gardiner E and Iarocci G (2014) Students with autism spectrum disorder in the university context: Peer acceptance predicts intention to volunteer. *Journal of Autism and Developmental Disorders* 44(5): 1008–1117.
- Gelbar NW, Smith I, Reichow B, et al. (2014) Systematic review of articles describing experience and supports of individuals with autism enrolled in college and university programs. *Journal of Autism and Developmental Disorders* 44: 2593–2601.
- Gillespie-Lynch K, Brooks PJ, Someki F, et al. (2015) Changing college students' conceptions of autism: An online training to increase knowledge and decrease stigma. *Journal of Autism and Developmental Disorders* 45(8): 2553–2566.
- Gilson CB and Carter EW (2016) Promoting social interactions and job independence for college students with autism or intellectual disability: A pilot study. *Journal of Autism and Developmental Disorders* 46: 3583–3596.
- Glennon TJ (2001) The stress of the university experience for students with Asperger syndrome. *Work* 17: 183–190.
- Glennon TJ (2016) Survey of college personnel: Preparedness to serve students with autism spectrum disorder. *American Journal of Occupational Therapy* 70(2): 7002260010.
- Hart D, Grigal M and Weir C (2010) Expanding the paradigm: Postsecondary education options for individuals with autism spectrum disorder and intellectual disabilities. *Focus on Autism and Other Developmental Disabilities* 25(3): 134–150.
- Hesselmark E, Eriksson JM, Westerlund J, et al. (2015) Autism spectrum disorders and self-reports: Testing validity and reliability using the NEO-PI-R. *Journal of Autism and Developmental Disabilities* 45: 1156–1166.
- Howlin P, Goode S, Hutton J, et al. (2004) Adult outcome for children with autism. *Journal of Child Psychology and Psychiatry* 45(2): 212–229.
- Howlin P, Moss P, Savage S, et al. (2013) Social outcomes in mid-to later adulthood among individuals diagnosed with autism and average nonverbal IQ as children. *Journal of the American Academy of Child and Adolescent Psychiatry* 52(6): 572–581.
- Landis JR and Koch GG (1977) The measurement of observer agreement for categorical data. *Biometrics* 33: 159–174.
- Langford-Von Glahn SJ, Zakrajsek T and Pletcher-Rood S (2008) Teaching students with Asperger syndrome (and other disabilities) in the college classroom: Creating an inclusive learning environment. *Journal on Excellence in College Teaching* 19(2–3): 107–133.
- McGuire JM and Scott SS (2006) An approach for inclusive college teaching: universal design for instruction. *Learning Disabilities: A Multidisciplinary Journal* 14: 21–32.
- Madriaga M and Goodley D (2010) Moving beyond the minimum: Socially just pedagogies and Asperger's syndrome in UK higher education. *International Journal of Inclusive Education* 14(2): 115–131.
- Mattanah JF, Ayers JF, Brand BL, et al. (2010) A social support intervention to ease the college transition: Exploring main effects and moderators. *Journal of College Student Development* 51(1): 93–108.
- Matthews NL, Ly AR and Goldberg WA (2015) College students' perceptions of peers with autism spectrum disorder. *Journal of Autism and Developmental Disabilities* 45: 90–99.
- Nevill RA and White SW (2011) College students' openness toward autism spectrum disorders: Improving peer acceptance. *Journal of Autism and Developmental Disorders* 41(12): 1619–1628.
- Newman L, Wagner M, Knokey A-M, et al. (2011) *The post-high school outcomes of young adults with disabilities up to 8 years after high school*. A Report From the National Longitudinal Transition Study-2 (NLTS2), NCSER 2011-3005. Menlo Park, CA: SRI International. Available at: www.nlts2.org/reports/

- O'Brien J and O'Brien CL (2006) *Implementing Person Centred Planning: Voices of Experience*. Toronto, ON, Canada: Inclusion Press.
- Robertson J, Emerson E, Hatton C, et al. (2005) *The Impact of Person Centred Planning*. Lancaster: Institute for Health Research, Lancaster University.
- Rosenberg M (1989) *Society and the Adolescent Self-Image*. Revised ed. Middletown, CT: Wesleyan University Press.
- Roux AM, Shattuck PT, Rast JE, et al. (2015) Characteristics of two-year college students on the autism spectrum and their support services experiences. *Autism Research and Treatment* 2015: 391693 (10 pp.).
- Russell DW (1996) UCLA Loneliness Scale (version 3): Reliability, validity and factor structure. *Journal of Personality Assessment* 66(1): 20–40.
- Shattuck PT, Narendorf SC, Cooper B, et al. (2012) Postsecondary education and employment among youth with an autism spectrum disorder. *Pediatrics* 129: 1042–1049.
- Smith CP (2007) Support services for students with Asperger's syndrome in higher education. *College Student Journal* 41(3): 515–531.
- Taylor JL and Seltzer MM (2011) Employment and post-secondary educational activities for young adults with autism spectrum disorders during the transition to adulthood. *Journal of Autism and Developmental Disabilities* 41(5): 566–574.
- Tipton LA and Blacher J (2014) Brief report: Autism awareness: Views from a campus community. *Journal of Autism and Developmental Disorders* 44(2): 477–483.
- Trembath D, Germano C, Johanson G, et al. (2012) The experience of anxiety in young adults with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities* 27(4): 213–244.
- UDI Online Project (2009) *Examples of UDI in Online and Blended Courses*. Center on Postsecondary Education and Disability. University of Connecticut, Storrs. Available at: <http://udi.uconn.edu/index.php?q=content/examples-udi-online-and-blended>
- Van Hees V, Moyson T and Roeyers H (2015) Higher education experiences of students with autism spectrum disorder: Challenges, benefits and support needs. *Journal of Autism and Developmental Disorders* 45(6): 1673–1688.
- Van Heijst BFC and Geurts HM (2015) Quality of life in autism across the lifespan: a meta-analysis. *Autism* 19(2): 158–167.
- VanBergeijk E, Klin A and Volkmar F (2008) Supporting more able students on the autism spectrum: College and beyond. *Journal of Autism and Developmental Disorders* 38: 1359–1370.
- White D, Hillier A, Frye A, et al. (2016a) College students' knowledge and attitudes towards students on the autism spectrum. *Journal of Autism and Developmental Disorders*. Epub ahead of print 26 May. DOI: 10.1007/s10803-016-2818-1.
- White SW, Elias R, Salinas CE, et al. (2016b) Students with autism spectrum disorder in college: Results from a preliminary mixed methods needs analysis. *Research in Developmental Disabilities* 56: 29–40.
- White SW, Richey JA, Gracanin G, et al. (2016c) Psychosocial and computer-assisted intervention for college students with autism spectrum disorder: Preliminary support for feasibility. *Education and Training in Autism and Developmental Disabilities* 51(3): 307–317.
- Wolf LE, Brown JT and Bork RK (2009) *Students with Asperger Syndrome: A Guide for College Personnel*. Shawnee, KS: Autism Asperger Publishing Co.

Appendix I

Focus group questions

1. Has being in this group influenced the way you handle your academic work? If so, how?
2. Has being in this group impacted your social skills and/or relationships with others?
3. Have your experiences at (name of university) changed in any way as a result of participating in Connections?
4. For you, what were the most beneficial aspects of Connections?
5. How could we improve the Connections program?