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Craig Thompson[a,b], Sven Bölte[a,b,c,d], Torbjörn Falkmer[a,b,e,f] and Sonya Girdler[a,b]

[a]Cooperative Research Centre for Living with Autism (Autism CRC), Long Pocket, Brisbane, Queensland, Australia; [b]School of Occupational Therapy, Social Work and Speech Pathology, Curtin University, Perth, Western Australia, Australia; [c]Department of Women's and Children's Health, Pediatric Neuropsychiatry Unit, Center of Neurodevelopmental Disorders at Karolinska Institutet (KIND), Child and Adolescent Psychiatry Research Center, Karolinska Institutet, Stockholm, Sweden; [d]Child and Adolescent Psychiatry, Center for Psychiatry Research, Stockholm County Council, Stockholm, Sweden; [e]Pain and Rehabilitation Centre, and Department of Medical and Health Sciences, Linköping University, Linköping, Sweden; [f]Department for Rehabilitation, Jönköping University, Jönköping, Sweden

ABSTRACT

Background: Despite recognition of the challenges faced by students with autism spectrum disorders (ASD) there is limited understanding of the barriers and facilitators to participation in major life areas, such as being a university student.

Aim/Objective: This research aimed to examine viewpoints on what affects the success of Australian university students with ASD.

Material and Method: Q-methodology was used to describe the viewpoints of university students with ASD, their parents and their mentors, on success at university for students with ASD. A total of 57 participants completed the Q-sort.

Results/Findings: Three viewpoints emerged; *Individualised Support*, *Contextual Support* and *Social Support*.

Conclusions: This study highlighted that supports need to be individualized to the barriers and facilitators faced by Australian students with ASD. Supports also need to be contextualized to the built and social environments of universities.

Significance: This study supports the premise that environmental interventions can be effective in facilitating participation in major life areas, such as university education. Peer mentoring for students with ASD may have utility for this group, but should be extended to include social, emotional and psychological support.

Introduction

Students with Autism Spectrum Disorder (ASD) experience many challenges with social communication and interaction, with routinized, repetitive and restricted patterns of behavior [1] impacting negatively on quality of life [2]. These challenges are reflected in the consistently poor outcomes of this group in important life areas, such as education, employment [3] and social relationships [4]. Research in North America, UK and Sweden has demonstrated that individuals with ASD have low participation rates in further education and employment [3–8]. It is estimated that in Australia only 40% of people with ASD participate in the labor market compared to 53% of all people with other disabilities and 83% of those without disabilities [9]. Similarly, 77% of people with ASD have no post-secondary school qualifications

compared to 54% with all other disabilities and 44% without disabilities [9]. It has also been observed that few individuals with ASD live independently [6,10], with most having few friendships [6,11]. Despite wide recognition of the challenges they face there are few support services [12] and evidence based interventions targeting the needs of young adults with ASD [13]. This is particularly concerning given the unprecedented number of individuals with ASD transitioning to adulthood [14].

While post-secondary education is an effective strategy in improving outcomes for this group [15,16] university students with ASD, including those with average to high intellectual capacities, are at increased risk of not completing their course [17]. Impairments in social communication [18] and executive functioning [19] complicate adaptation to university life for these students. Universities are inherently

unstructured, with navigation relying heavily on self-management and self-advocacy skills [20,21]. When combined with limited support services [22] these stressors can contribute to poor mental health and all too frequently result in students with ASD withdrawing from university [23].

The post-school transition period is a stressful time for families as they attempt to support their family member with ASD transitioning into adulthood in an environment characterized by limited supports and opportunities [24,25]. Rigorous qualitative research enables an understanding of the lived experience of people living with ASD, with particular utility in informing the development of theory and evidence-based interventions [26]. As such the aim of the present study was to explore the viewpoints on successful navigation of university for students with ASD, from the perspectives of the students and those that support them.

Methods

Design

Due to the inherent communication challenges experienced by young adults with ASD traditional qualitative approaches to data collection, such as interviews and focus groups, can be challenging. Q-methodology employs both inductive and deductive approaches, enabling exploration of a target group's viewpoints in relation to a specific topic while minimizing the need for verbal communication [27,28]. Q-methodology has demonstrated particular utility in ASD in examining viewpoints in relation to driving [29], public transport [30] and employment [31]. This method enables the description and prioritization of viewpoints with relatively small numbers of participants [27].

Sample

Adults who self-reported to meeting one of the following criteria were invited to participate in the study: i) having met the diagnostic criteria for ASD and at some time enrolled in a course in an Australian university, or ii) experience working with a student with ASD either as a disability support worker or student mentor, or iii) being a parent of a student with ASD who had attempted university education in Australia. Purposive and snowball sampling through specialist student mentoring programs, universities, autism associations and social media recruited 57 participants from across Australia. Eight of the participants were mothers and four were fathers of university students with ASD (mean age was 53.7 years, SD =8.9). There were four male and 15 female graduate student mentors of university students with ASD (mean age was 28.3 years, SD =6.0). There were three disability services staff members (one male and two female; mean age 55.7 years; SD =2.1), and 23 students with ASD participated in the study (17 male and six female; mean age 24.6 years; SD =7.2). All participants had sufficient proficiency in English to read Q-sort statements. Table 1 outlines the participants' characteristics.

Procedure

Q-methodology follows five steps: i) developing a concourse reflecting the area of inquiry, ii) identifying the salient Q-sort statements, iii) administering the Q-sort (Figure 1), iv) by-person factor analysis and, v) interpreting the factors (viewpoints). Q-methodology studies aim to select participants in order to describe the variation between known groups [28]. In this study Q-methodology identified, categorized and revealed the viewpoints of students with ASD and their parents, mentors and support workers in relation to university environments for students with ASD.

i. Developing the 'concourse'. The concourse relating to 'the barriers and facilitators to participating in university environments for students with ASD was developed drawing from the following sources: the recent systematic review by Gelbar, Smith and Reichow (2014) on supporting students with ASD at university; an educational specialist and a psychologist with two years' experience in coordinating student mentoring programs for students with ASD; informal meetings with individuals who supported university students with ASD; and, a focus group study conducted by the authors with parents of young adults with ASD [32]. Candidate statements were reviewed by various stakeholders, resulting in the final concourse.

ii. Identifying the Q-sort statements. Employing the above concourse as a reference, statements relating to barriers and facilitators on the success at university for students with ASD were reviewed by eight neurotypical adults (all with experience in working with people with ASD) to ensure readability, interpretability and potential suitability. Following feedback these statements were again refined, and then reviewed by two adults with ASD who had

Table 1. Participants characteristics and viewpoint loading on the three viewpoints from defining Q-sorts.

Characteristics with respect to age, gender and ASD group	Viewpoints		
	1	2	3
Male, 19, student with ASD	0.6429*	−0.1277	0.1565
Male, 20, student with ASD	0.7254*	0.2897	0.2286
Male, 22, peer mentor	0.7877*	0.1306	0.2430
Female, 19, peer mentor	0.5988*	0.2939	0.1762
Male, 18, student with ASD	0.8001*	0.0911	0.0891
Female, 50, parent of a student with ASD	0.7293*	0.3247	0.3501
Female, 40, peer mentor	0.7099*	0.4358	0.0355
Male, 23, student with ASD	0.6465*	0.3391	−0.0354
Female, 42, parent of a student with ASD	0.6626*	0.3728	0.3302
Female, 51, parent of a student with ASD	0.1939	0.8395*	−0.0046
Male, 36, student with ASD	0.3805	0.6119*	0.0297
Female, 24, peer mentor	0.3232	0.7095*	0.2959
Female, 55, disability services staff member	0.3094	0.6748*	0.4068
Male, 19, student with ASD	0.4726	0.6322*	0.2348
Female. 22, student with ASD	0.1397	0.8150*	0.1313
Male, 29, peer mentor	0.2067	0.0868	0.7306*
Female, 25, peer mentor	0.3463	0.1476	0.6877*
Male, 18, student with ASD	0.3251	0.0469	0.2948
Female, 41, peer mentor	0.3241	0.2361	0.0493
Female, 54, parent of a student with ASD	0.2946	0.4371	0.2029
Female, 20, student with ASD	0.6135	0.3751	0.1804
Female, 57, parent of a student with ASD	0.4773	0.3864	0.1587
Male, 65, parent of a student with ASD	0.3805	0.3959	0.3970
Female, 28, peer mentor	0.6424	0.4466	0.2334
Male, 28, student with ASD	0.3728	0.1177	0.4859
Female. 50, student with ASD	0.0543	0.1279	0.2709
Female, 25, peer mentor	0.2433	0.4910	0.2683
Male, 48, parent of a student with ASD	0.5268	0.3502	0.4012
Male, 23, student with ASD	0.2078	0.3041	0.0821
Female, 45, parent of a student with ASD	0.5858	0.4310	2708
Female, 31, peer mentor	0.4645	0.3032	0.2625
Male, 29, peer mentor	0.4731	0.4584	0.2209
Male, 30, student with ASD	0.5205	0.2731	0.2012
Male, 25, student with ASD	0.4893	0.4706	−0.0023
Female, 22, peer mentor	0.4923	0.4570	0.3364
Female, 39, student with ASD	0.2114	0.2589	0.2324
Female, 20, student with ASD	0.0380	0.0807	0.2152
Female, 26, peer mentor	0.3276	0.3749	0.0453
Female, 23, peer mentor	0.6616	0.3220	−0.0348
Male. 23, student with ASD	0.2751	0.2806	−0.0424
Male, 24, student with ASD	0.4978	0.4285	0.0835
Male, 63, parent of a student with ASD	0.5683	0.1799	0.1601
Female, 35, peer mentor	0.5925	0.4980	0.2212
Female, 23, student with ASD	0.2273	0.3155	0.1262
Female, 72, parent of a student with ASD	0.5840	0.2945	0.2605
Female, 58, disability services staff member	0.6617	0.4234	0.4000
Male, 21, student with ASD	0.1729	0.1193	0.2474
Male, 27, peer mentor	0.4791	0.3175	0.2036
Female, 47, parent of a student with ASD	0.3373	0.4216	0.4295
Male, 28, student with ASD	0.4337	0.5817	−0.2251
Female, 20, student with ASD	0.5005	−0.0457	0.4493
Female, 25, peer mentor	0.5397	0.3522	0.2157
Female, 50, parent of a student with ASD	0.2214	0.4754	0.1711
Female, 31, peer mentor	0.1658	0.4012	0.5441
Male, 54, disability services staff member	0.6126	0.3583	0.4138
Female, 35, peer mentor	0.4635	0.1752	0.3913
Male, 22, student with ASD	0.0442	−0.1056	−0.2776

*Indicates sorts loading highly on each factor.

attended university. In order to establish content validity, all pilot participants were questioned as to whether or not they thought that any statements were missing, and if so what should be added. Following this process a set of 37 statements were identified, comprising the final Q-sort pack used in this study (Supplementary Appendix 1).

iii. Administering the Q-sort. All participants completed the Q-sort on-line (Figure 1). The participants were asked to carefully read all 37 statements, considering how much they agreed or disagreed with each statement in relation to its impact on success at university for students with ASD. Participants sorted the statements
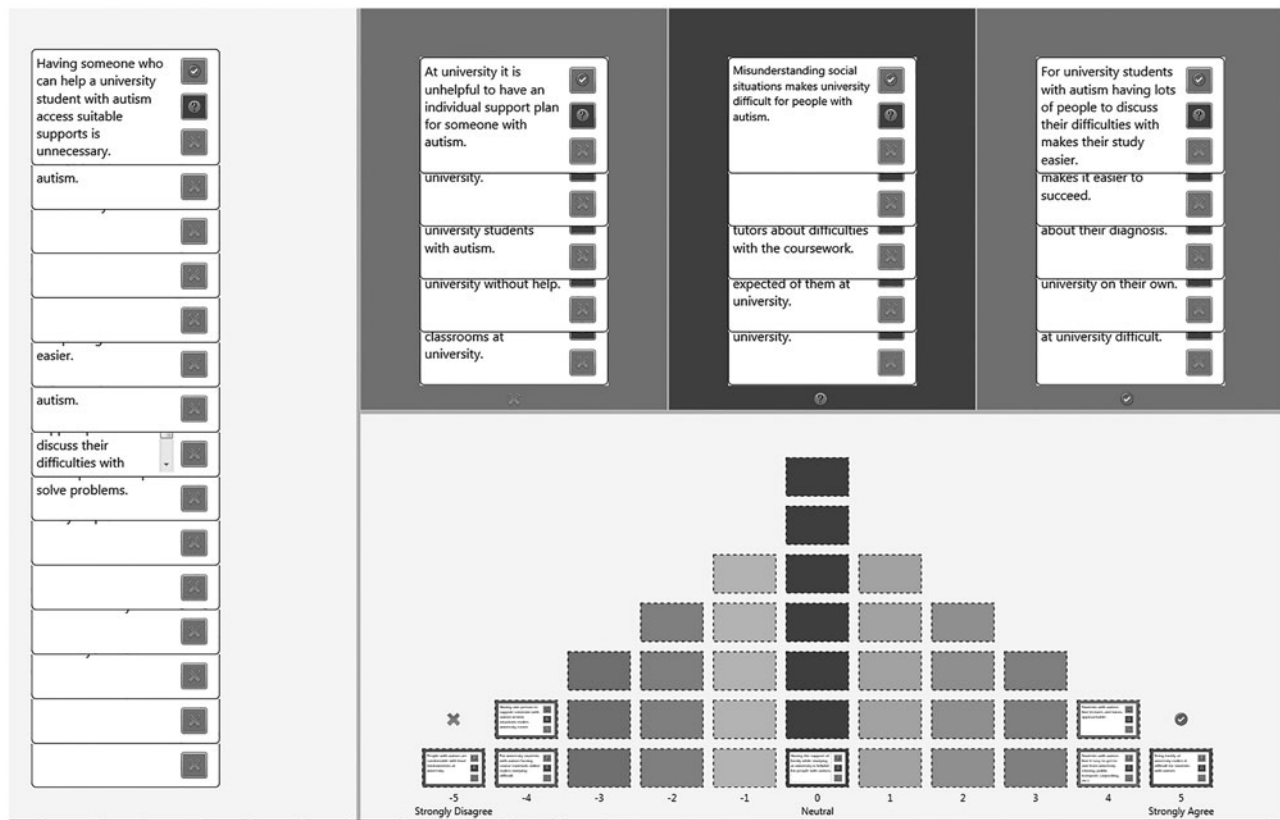
Figure 1. Illustration of how sorting the 'cards' appeared to a participant using the on-line Q-sort program, developed by Curtin Autism Research Group.

onto a normally distributed sorting grid on a continuum of 'strongly disagree' to 'strongly agree', with ranking values of −5 (strongly disagree) 0 to (neutral) to +5 (strongly agree). The sorting grid delineated the maximum number of statements for each rank as indicated in Figure 1. Participants were only able to place one statement in each square, with all squares needing to be filled to complete the Q-sort. It was also highlighted to participants that there were no right or wrong answers, and that they were able to move statements until they were satisfied that the Q-sort accurately represented their viewpoints. Participants were invited to propose any statement not included in the original concourse. Seven suggestions were offered.

iv. Data analysis. Q-sorts from each of the 57 participants, were analyzed using varimax by-person centroid factor analysis in the PQ Method software package [33]. The factor analysis grouped individuals, correlating individual participant's responses with those of others. Varimax rotation maximized the number of participant Q-sorts included within each factor, with resulting factors, i.e. viewpoints optimally accounting for and

representing the variance. PQ Method software detects those individual Q-sorts that significantly ($p < 0.05$) define a particular viewpoint, identifying participants who sorted the statements in a similar manner, along the agreement and disagreement continuum. It also pinpoints consensus statements, or statements which do not differ significantly across all viewpoints.

The process of selecting the statements forming the viewpoints followed a step-wise criteria, organized hierarchically in descending order of importance. The first criterion, known as the 'magic number 7', indicates that seven factors is the default number for extraction within the PQ Method [33], and the suggested starting point for analysis [28]. This approach ultimately facilitates the identification of a final set of factors that account for a substantial portion of the variance [28]. The second criterion, the Kaiser-Guttman criterion measured in eigenvalues, adheres to the rule that only those factors with an eigenvalue greater than 1.00 should be considered for inclusion [34]. In this study, five factors met this criterion. The third criterion is the acceptance of only those factors that have two or more significantly loading Q-sorts. In this study only factors one, two and three fulfilled
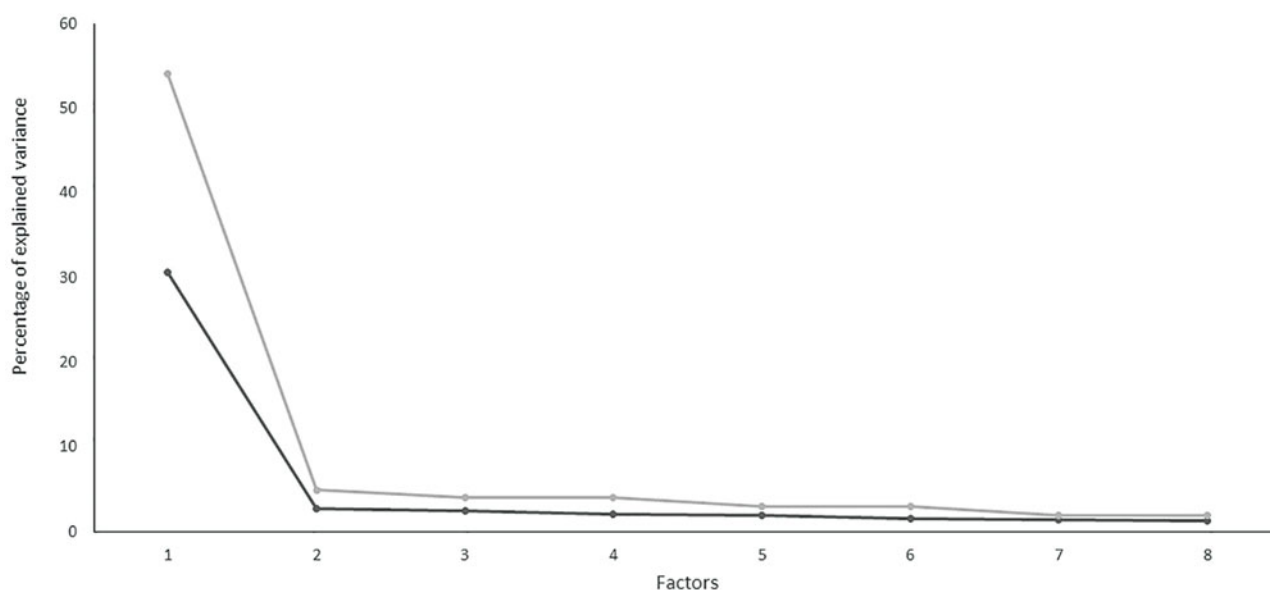
Figure 2. Screen plot of explained variance.

this criterion. As a result, viewpoints four and five were borderline and ultimately omitted. The next criteria to be fulfilled, Humphrey's rule, specifies that a factor is only significant if multiplication of the two highest absolute loadings is greater than twice the standard error [27]. In this study the standard error was 0.16, with viewpoints one, two and three meeting this criterion. Lastly, a scree plot of viewpoints was generated and evaluated in relation to the assumption that all factors displayed prior to plateauing should be retained as a viewpoint (Figure 2). While the scree plot clearly plateaued after two viewpoints, three of the viewpoints fulfilled all other criteria for inclusion, with viewpoints two and three correlating with viewpoint one at 0.6 and 0.5, respectively, essentially removing any risk of collinearity between them. Collectively these results supported the acceptance of three viewpoints, as the stepwise progression through the seven criteria determined that three viewpoints should be considered.

Factor interpretation. In interpreting the factors, each researcher independently examined the statements defining each particular viewpoint with consensus achieved through discussion regarding the naming and identification of the viewpoints.

Ethics

Informed consent was obtained from all participants prior to data collection, and all data were de-identified to ensure confidentiality. Data were securely stored on a password-protected computer at Curtin University, Western Australia. The study was approved through Curtin University Human Research Ethics committee (HR16/2014) in Perth, Western Australia. The research also conformed to the Declaration of Helsinki.

Results

Viewpoint 1: Individualised support

The *Individualised support* viewpoint was defined by nine participants representing all three groups (Table 1) and characterized by its reference to the importance of tailored supports facilitating success at university for students with ASD. Participants loading on this viewpoint indicated that working with a mentor made studying at university easier for students with ASD (statement 14: rating +5) and that it was helpful to have a support person to discuss difficulties with in relation to their coursework, or lecturers or tutors (statement 8: +4). For these participants having a single person supporting a student with ASD made university easier (statement 15: +4), including having one person to assist in accessing suitable supports at university (statement 15: −5). These participants indicated that it was important for students with ASD to meet their peers with ASD at university (statement 13: −4) and to have an individual support plan (statement 20: −4). Table 2 presents the full details.

Viewpoint 2: Contextual support

The *Contextual support* viewpoint was defined by six participants from across all participant groups (Table 1). This viewpoint was distinguishable by its

Table 2. Mean rating across participants for defining statements in viewpoint one Individualised Support (5 = strongly agree to −5 = strongly disagree).

	Viewpoints		
Statements	1	2	3
Working with a mentor at university makes studying at university easier for students with autism	5	3	3
University students with autism find it helpful to have a support person to discuss their difficulties with coursework, or lecturer or tutor	4	4	2
Having one person to support someone with autism in new situations makes university easier	4	2	2
Meeting other people with autism at university is unnecessary	−4	−1	−4
At university it is unhelpful to have an individual support plan for someone with autism	−4	−1	−1
Having someone who can help a university student with autism access suitable supports is unnecessary	−5	−1	2

Table 3. Mean rating across participants for defining statements in viewpoint two Contextual Support, strongly agree (5 = strongly agree to −5 = strongly disagree).

	Viewpoints		
Statements	1	2	3
Having the support of family while studying at university is helpful for people with autism.	3	5	1
University students with autism find it helpful to have a support person to discuss their difficulties with coursework, or lecturer or tutor.	4	4	2
Disability services at university are helpful for people with autism	3	4	−3
Students with autism find it easy to get to and from university (driving, public transport, carpooling, etc.)	0	−4	1
It is easy for students with autism to find their way to their classrooms at university	1	−4	1
People with autism are comfortable with loud environments at university	0	−5	2

emphasis on the supports that students with ASD needed to manage the university environment. Participants indicated that having the support of family while studying at university was helpful (statement 16: +5). A support person to discuss their difficulties with coursework, or lecturer or tutor (statement 8: +4), and the assistance of disability services at university (statement 2: +4) were also helpful for students with ASD. Noisy environments at university were problematic for students with ASD (statement 19: −5). The participants indicated that it could be challenging for students with ASD to locate their classrooms (statement 16: −4) and that transportation to and from university could also be a barrier (statement 24: −4). Table 3 presents the full details.

Viewpoint 3: Social support

The *Social support* viewpoint was defined by two peer mentors. This viewpoint was characterized by the supports students with ASD needed to manage relationships with staff and other students in facilitating success at university. Participants recognized that day-to-day support made studying at university easier for students with ASD (statement 9: 4), noting that peer support of students with ASD at university made completing studies easier (statement 10: 4). Participants highlighted that bullying at university potentially make studying more challenging for students with ASD (statement 4: 5). The participants indicated that meeting other students with ASD at university was necessary (statement 13: −4). Working

with other students on assignments was also seen as difficult for university students with ASD (statement 27: −4), and similarly solving problems without assistance (statement 28: −5). Participants also noted that central student services at university were not helpful for students with ASD (statement 1: −4). Table 4 presents the full details.

Consensus and contended statements

Sixteen consensus statements were identified, with no statistically significant difference in the scores across the viewpoints. Some of these statements made reference to the impact of university services such as the library, online course material and the Student Guild on the potential success of students with ASD at university. Another area of consensus related to the impact of friendships and loneliness. Statements regarding the communication skills of students with ASD were ranked negatively across all three viewpoints. Statements relating to the need for individualized support for students with ASD scored equally positively across all three viewpoints. Table 5 presents the full details.

Contended statements are those that differed the most in their scoring across the viewpoints. The contended statements for *viewpoint 1* were the statements "at university it is unhelpful to have an individual support plan for someone with autism" (−4 to −1) and "having someone who can help a university student with autism access suitable supports is unnecessary" (−5 to 2). Contended statements for *viewpoint 1* also

Table 4. Mean rating across participants for defining statements in viewpoint three Social Support, strongly agree (5 = strongly agree to −5 = strongly disagree).

Statements	Viewpoints		
	1	2	3
For people with autism being bullied at university makes it difficult to study	2	1	5
Having day-to-day support makes studying at university easier for students with autism	3	2	4
Peer support of people with autism at university makes completing studies easier	3	2	4
Central student services at university are helpful for people with autism	0	1	−4[a]
Meeting other people with autism at university is unnecessary	−4	−1	−4[a]
Working with other students on assignments is easy for university students with autism	−1	−3	−4[a]
Students with autism are able to solve difficulties that arise at university without help	−1	−2	−5

[a]indicates that these statements tied for the two '−4' places in the Q-sort grid.

Table 5. Mean rating across participants for consensus statements, strongly agree (5) to strongly disagree (−5).

Statements	Viewpoints		
	1	2	3
The library is easy to use for students with autism	2	1	2
University students with autism find the quiet study areas in the library helpful	2	2	2
At university it is unnecessary for students with autism to have a peer to help solve problems	−3	−2	−2
University students with autism find it helpful to have a support person to discuss their difficulties with coursework, or lecturer or tutor	4	4	2
Having day-to-day support makes studying at university easier for students with autism	2	3	4
Peer support of people with autism at university makes completing studies easier	3	2	4
The student guild at university is helpful for people with autism	0	0	0
Having one person to support someone with autism in new situations makes university easier	4	2	2
For university students with autism having course materials online makes studying difficult	−3	−2	−2
Interacting with university staff is easy for people with autism	−1	0	−1
Being lonely at university makes it difficult for students with autism	0	1	0
The communication skills of students with autism are effective for university	−1	−2	−1
University students with autism find it easy to speak to lecturers or tutors about difficulties with the coursework	−2	0	−2
It is easy for students with autism to form friendships at university	−2	−1	−1
For university students with autism having lots of people to discuss their difficulties with makes their study easier	1	0	0
For students with autism at university it helps to tell people about their diagnosis	1	0	1

pertained to social situations including "misunderstanding social situations makes university difficult for people with autism" (−2 to 3) and "for students with autism not having friends at university makes it easier to succeed" (−2 to 0). Another contended statement relating to social interaction in this viewpoint was "working with other students on assignments is easy for university students with autism" (−1 to −4). The final set of contended statements for *viewpoint 1* related to the university environment, including the statements that "central student services at university are helpful for people with autism" (0 to −4) and "people with autism are comfortable with loud environments at university" (0 to −5).

For *viewpoint 2* contended statements related to social skills and situations as indicated by the scoring of the statements that "meeting similar people at university is unhelpful for people with autism" (0 to −3) and "meeting other people with Autism at university is unnecessary" (−1 to −4). Interacting with university staff also featured in the contended statements of *viewpoint 2*, including that "students with autism find lectures and tutors approachable" (1 to −1) and "central student services at university are helpful for people with autism" (1 to −4). University study skills

were also highlighted as contended statements for *viewpoint 2* including "the time management skills of someone with autism makes studying at university difficult" (3 to 0) and "it is easy for students with autism to make decisions about university on their own" (−3 to 0). The logistical issues associated with attending university were also present in the contended statements of *viewpoint 2* including "people with autism know what to do between classes at university" (−3 to 1), "it is easy for students with autism to find their way to their classrooms at university" (−4 to 1) and "students with autism find it easy to get to and from university (driving, public transport, carpooling, etc.)" (−4 to 1). Support at university was another contended statement within this viewpoint represented by the contended statements "having someone who can help a university student with autism access suitable supports is unnecessary" (−1 to 2) and "peer support of people with autism at university makes completing studies easier" (2 to 4).

The contended statements for *viewpoint 3* referred to the available supports both on and off university campuses in the statements "having someone who can help a university student with autism access suitable supports is unnecessary" (2 to −5) and "having the

support of family while studying at university is helpful for people with autism" (1 to 5). Another area of contended statements related to university services in the items "central student services at university are helpful for people with autism" (−4 to 0) and "disability services at university are helpful for people with autism" (−3 to 4). The range of social challenges experienced by students with autism at university was also evident in the contended statements related to viewpoint 3 in the item "for people with autism being bullied at university makes it difficult to study" (5 to 1).

Discussion

The viewpoints, *individualized support*; *contextual support*; and *social support* illustrate the participants' perspectives of what is required to facilitate participation and success at university for students with ASD. All three groups defined and loaded proportionally on all three viewpoints. These results support previous research that has proposed that university students with ASD have unmet needs which if met would facilitate their completion of university [35].

Viewpoint 1, relating to individualized support, corresponds with recognition that university students with ASD require support to be successful [21]. While ASD can be recognized by a constellation of core symptoms, diagnosed individuals vary greatly with regards to their difficulties, strengths and skills. This heterogeneity means that effective support needs to be tailored and individualized [36], and while there are instances where the support needs of students with ASD align with those of other students, this viewpoint extends the concept of support to include both the academic and social aspects of university life [37]. It is likely that an individualized approach to support could capitalize on the strengths and abilities of young people with ASD.

Viewpoint 2 reflects the importance of contextual support and focuses on the uniqueness of higher education environments. While post-secondary qualifications have been promoted as a means of improving outcomes for adults with ASD, achieving these has not been realized for many [4,23]. There is a clear need for models of support specifically aimed at meeting the needs of individuals and their families transitioning from secondary school to university [3], a transition reported to be particularly challenging for those with ASD [17]. Recent research suggests that autism specific transition tools, such as the BOOST-A [38,39], if used early on during secondary school can

mitigate this challenge. While university based disability services are available and able to provide a range of supports to students with ASD, they largely rely on students instigating contact and self-advocating, behaviors which students with ASD likely find difficult [35,40].

The core social impairments associated with ASD point to the need to broaden the standard support services available to these students to include social and communication supports [21]. Attending university presents many environmental challenges for students with ASD including, in the first instance, navigating to and from university [41]. The impact of transportation as a barrier to community access for students with ASD should not be underestimated [29,30]. Once at university and in class, students with ASD are likely to encounter many sensory challenges, including loud or crowded environments, and may require assistance in managing these effectively [42].

The social communication difficulties experienced by university students with ASD highlighted in *viewpoints 1* and *2* of this study, serve to remind researchers, supporters and health professionals that people with ASD continue to be challenged by social communication into adulthood. This finding points to the need for adult services which provide individualized and contextualized support targeting these social difficulties. An approach likely to ameliorate these challenges within universities is coordinated and strengths-focused peer mentoring. As universities broadly allow students to select subject areas based on personal interests it is an environment which potentially enables students with ASD to capitalize on their strengths and special interests [43], providing opportunities for the development of greater self-efficacy [44]. Social skills training is another approach demonstrating promising results in adolescents [45,46] and adults with ASD [47], and may be effective in helping young adults with ASD to manage at university.

Viewpoint 3 highlights the challenges that students with ASD experience in negotiating complex social interactions with university students, academic and administrative staff. This is not surprising given the core deficit of social communication in ASD makes social interactions challenging, with viewpoint three highlighting that at least some of these students experience bullying at university [21]. Negative social experiences, such as bullying, may have long lasting deleterious effects on people with ASD and young adults with ASD do report high levels of dissatisfaction with their social interactions [23]. Perhaps individualized social modeling and coaching could be

utilized as a means of managing the social milieu of university, supporting improved social engagement [21,35].

The higher education sector has for many years been making 'reasonable adjustments' and implementing strategies to assist students with disabilities to manage in university environments [48,49]. While these adjustments are often available for students with ASD in response to their self-advocacy and requests for assistance [50], there is a need for supports which are proactive in encouraging students to ask for support.

Difficulties with executive functioning experienced by university students with ASD have been well documented in childhood [51,52] with recent evidence demonstrating these persist into adulthood [19]. Viewpoints 1, 2 and 3 all point to the benefit of support from one person who has empathy and understanding of the experiences of someone with ASD [53]. This is congruent with a recent finding that 62% of parents of young adults with ASD identify mentoring as the most important unmet service need [54]. Assisting or mentoring someone with ASD to improve their social interactions is challenging [55], with support people themselves requiring opportunities for debriefing [53]. A coordinated peer mentoring program has the potential to engender a supportive environment and facilitate participation in major life areas, including being a university student [56–58]. While peer mentoring has been proposed as potentially effective in supporting students with ASD [59,60] research in this field has been hampered by poor definition of peer mentoring in higher education [61] and limited theoretical frameworks [61]. The role of a peer mentor has been proposed as a 'connecting link, peer leader, learning coach, student advocate, and trusted friend' [62,p. 130–131]. While initial peer mentoring programs have offered promise, further research is needed to understand its effectiveness in promoting greater success at university for students with ASD [63,64].

The nature of the Q-sort methodology introduces a possible limitation to this study. When conducting a Q-sort study great care is taken to ensure the concourse comprises a thorough representation of potential viewpoints, but these are inherently limited to the chosen statements [28]. In this study this was mitigated by the rigorous approach to developing the concourse and participants were encouraged to suggest any viewpoint not included in the original concourse [65]. Q-methodology operates with by-person factor analysis, not by-item, so the need for large samples is not warranted [28]. Rather, the guiding principle that the number of participants should be equal to the number of statements is adopted, with the present study far exceeding this expectation. The Q-methodology has limited ability to contrast between different groups of participants, therefore, this study cannot compare and/or contrast the views of the stakeholders. The different viewpoints that resulted from the Q-methodology are defined by participants and considering viewpoint 3 was defined by two participants there was a potential for error. The nature of this study being conducted using the on-line Q-sort resulted in the sample self-selected students with ASD or as one of the other groups, and the results must be interpreted with this in mind.

The development of evidence-based interventions and strategies aimed at assisting university students with ASD is a clear research priority, specifically the potential efficacy of environmental interventions such as peer mentoring warrant further investigation. The approach of peer mentoring itself requires more definition in terms of theoretical underpinnings and active ingredients [61]. Future research would benefit from more a greater involvement of individuals with ASD to ensure the focus of research has increased meaning and validity for the people in question.

Conclusions

Findings from this study suggest that it would be beneficial for universities to employ individualized and strength-based approaches in supporting students with ASD, with support best provided by one person with understanding of the nuances of each individual, and extending to contextual and social supports. Interventions guided by these principles could potentially facilitate the success of students with ASD at university, ultimately improving lifelong outcomes.

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ORCID

Craig Thompson (ID) http://orcid.org/0000-0002-0912-0362
Sven Bölte (ID) http://orcid.org/0000-0002-4579-4970
Torbjörn Falkmer (ID) http://orcid.org/0000-0002-0756-6862
Sonya Girdler (ID) http://orcid.org/0000-0001-7992-0800

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