



The experiences of young autistic adults in using metropolitan public transport

REPORT

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Table of contents

1. Abstract	5
2. Introduction.....	6
3. Methods	9
3.1 Ethics	9
3.2 Recruitment.....	9
3.3 Participants	9
3.4 Design.....	14
3.5 Materials.....	14
3.6 Procedures.....	14
3.7 Analysis.....	15
4. Results.....	16
4.1 Anxiety, and the Need for Certainty	16
4.2 A Spectrum of Confidence.....	18
4.3 A Preference for Independence and Self-Reliance	19
4.4 Strategies for Managing	19
5. Discussion.....	21
5.1 Limitations	23
5.2 Implications	23
6. References	25

1. Abstract

For young autistic adults, accessing educational, employment and leisure activities is vital to gaining financial and social independence, and they often rely on public transport to travel to these activities. However, many of the tasks and experiences inherent in undertaking independent public transport travel can pose challenges for autistic people, potentially limiting their access to opportunities to learn, work and socialise, thus impacting their well-being. This paper reports on the findings of a qualitative study to explore the experience of young autistic adults in undertaking independent public transport travel in a large metropolitan city and the key issues they face in doing so.

Personal, phone and email interviews and a focus group gathered descriptive information from 14 young autistic adults. Analysis applied constant comparative techniques to inductively and deductively identify key themes from the data.

Analysis produced four themes: 1) Anxiety and the Need for Certainty; 2) a Spectrum of Confidence; 3) a Preference for Independence and Self-Reliance; and 4) Strategies for Managing.

Findings indicated that a triad of factors makes the use of public transport in a metropolitan city stressful for young autistic adults: 1) their propensity to be intolerant of uncertainty; 2) the dominant role that anxiety plays; and 3) the impact of sensory processing, particularly the impact of crowding and associated tactile, auditory, and visual stimuli. The findings points to the potential utility of a smart phone applications for young autistic adults with functionality and information that can help ameliorate anxiety, particularly during trip planning, service disruptions and other times of uncertainty.

2. Introduction

For any young adult, access to educational, employment and leisure activities is vital for financial and social independence (Dudley et al., 2012). Many young autistic adults rely on public transport (i.e. public bus, train, tram and ferry services) as an affordable alternative to independently access the community (Falkmer et al., 2015), as they commonly experience difficulties in obtaining a licence to drive a car or motor vehicle (Curry et al., 2018; Deka et al., 2016) including a lack of autism-specific driver training programs (Wilson et al., 2018). The accessibility afforded by independent travel on public transport contrasts with the constraints that these young adults face if they are dependent on family and friends to provide transport. In these situations, family members themselves also bear a significant emotional and economic burden when they are the primary source of transportation for their adult children (Lubin & Feely 2016).

Independent access to, and use of, public transport in a large city can be a complex task that requires the user to deploy a multiplicity of skills and actions. It requires the user to forward-plan, be organised, interpret multiple and complex information systems and schedules, manage transfers between different modes of transport, seek help from unknown others, problem-solve unpredictable changes and be exposed to a range of sensory stimuli and information streams. Many of these tasks can pose challenges for autistic people, which may subsequently limit their access to opportunities to learn, work and socialise; thus impacting on their well-being (Bejerot et al., 2014; Dijkhuis et al., 2016; Hazen et al., 2014). Finding effective ways to support young autistic adults to manage and overcome such challenges is therefore vital for their successful transition to a fulfilling and independent adulthood.

To date, only a small number of empirical studies have examined the experiences of autistic adults in using public transport. Using Q-methodology to explore the viewpoints of adults with autism toward using public transport, Falkmer et al. (2015) compared and contrasted the barriers and facilitators of public transport use and preference, using a sample of adults with ($n = 54$; mean age: 24.6 [$SD = 10.3$]) and without autism ($n = 56$; mean age: 24.7 [$SD = 8.4$]). For the autistic adults, public transport used was primarily for travel to and from their place of work or education, rather than for social or communal activities. Overall, these autistic adults felt competent and comfortable using public transport. However, they reported that they were challenged when faced with crowds of commuters on public transport and identified issues with sensory processing, such as being in close physical proximity to and making unintended physical contact with other passengers, as the main barrier to more frequent public transport use.

Deka et al. (2016) used survey methodology to explore the transportation challenges faced by autistic adults (N = 703; age: 45.9% 18 – 21 years, 40.2% 22 – 29 years, 13.9% >30 years) in pursuing employment and/or volunteering. More than half of the participants reported difficulties in independent planning of public transport trips, while more than 40% ($n = 79$) had difficulty getting to public transport stations or stops without assistance.

Although the literature reports that the use of public transport is not always an easy or comfortable mode of transport for autistic adults, it also shows that they are able to successfully use the services, often by employing adaptive strategies to overcome their challenges. Using focus groups, Lubin and Feely (2016) delved into the strategies that autistic adults used to successfully navigate public transportation in New Jersey. Commonly used strategies included: use of detailed and advanced planning techniques; practice runs; rote learning of routes; and the use of travel applications on their smart phones.

The literature indicates that similar strategies have been used by adults with cognitive impairments, such as post-stroke patients. In addition to the role of personal motivation and self-determination in facilitating independent public transport use, the essential role of transit information in allaying uncertainty and anxiety, and boosting self-confidence and a sense of empowerment of stroke commuters is widely acknowledged (Risser et al., 2012; Waara et al., 2013). Strategies reported as being commonly-used by adults with mild cognitive disability include: use of advance trip planning techniques to decrease stress; planning for unexpected events; travelling with a companion; consciously avoiding stress during a trip to maintain control and find safe solutions; and drawing on personal characteristics such as stubbornness and courage to overcome feelings of low confidence or self-esteem (Ståhl & Månsson Lexell, 2017). Drawing on this literature provides insight into the strategies that can be used by adults who experience difficulties using public transport. It is possible that similar strategies are used and can be used by autistic adults to overcome some of the difficulties described previously (Lubin & Feely, 2016). Understanding strategies that autistic adults use to successfully navigate public transportation can inform the design of mechanisms to improve the ease and comfort of public transport in a way that suits their individual needs.

Although the current literature has identified both barriers to public transport use and coping strategies adopted by autistic adults, exactly how these barriers are experienced and dealt with by autistic individuals is yet to be understood. Limited quantitative findings identify independent planning and sensory issues as barriers to the use of public transport for autistic adults and highlight the need for a more comprehensive understanding of the experiences of young autistic adults in using public transport and the key issues they face in doing so. An in-depth understanding

of these issues, how they are experienced and dealt with by autistic adults can then enable the development of effective ways to support independent use of public transport with ease and comfort. By drawing on individual experiences of autistic adults, support mechanisms can be designed to assist these adults in a way best suited to their needs and foster independence.

To achieve this, this paper reports on the findings of a qualitative study investigating the experiences of young autistic adults in using public transport in Sydney, a large Australian city. The purpose of the study was to inform the future development of smart phone applications specifically designed to help young autistic adults to use public transport in their everyday life more independently and successfully.

3. Methods

3.1 Ethics

Ethics approval to conduct the study was obtained from Curtin University, Western Sydney University and Autism Spectrum Australia, and the study was conducted in accordance with the ethical standards of the human research ethics committees for these bodies. Written informed consent was obtained from all individual participants included in the study; verbal consent to record interviews was obtained prior to the start of each interview.

3.2 Recruitment

This study used multiple methods to recruit participants, including: calls for participants via the social media platforms of a major national autism service provider and the newsletter of a university disability service; email invitations to clients of a disability employment service provider and a major national autism organisation; and enlisting participants from previous research conducted with autistic adults. Interested participants registered to participate via an online information and consent form. This screened potential participants based on the study inclusion criteria: aged between 18 and 30 years; with a formal diagnosis of Autism/Autism Spectrum Disorder/Asperger's syndrome; and residing in or regularly travelling in the greater area of Sydney, thus allowing only those participants who met criteria to complete the online consent. The online registration also collected basic demographic and travel pattern data including gender, age, autism diagnosis, employment status, study status, residential arrangements; and modes of transport used for work, study and leisure.

3.3 Participants

Of the 16 young adults who registered to take part in the study, 14 participated in an interview. Inclusion in the study required participants to self-report as being aged between 18 to 30 years, and to have a formal diagnosis of Autism/Autism Spectrum Disorder/Asperger's syndrome.

Tables 1 and 2 provide details of the participant characteristics.

Table 1: Participant characteristics

Total no. participants		14
Age	18 – 30 years	14
Gender	Male	9
	Female	4
	Unspecified	1
Autism diagnosis	ASD/Autism/Autistic Disorder	8
	Asperger's Syndrome/Disorder	6
First language	English	13
	Other	1
Living arrangements	Independently without support	1
	With family or caregiver	13
In employment or study (for a qualification)	Paid work only	4
	Paid work & study	2
	Paid work & unpaid/voluntary work & study	1
	Unpaid/voluntary work only	4
	Unpaid/voluntary work & study	1
	Not employed, studying	1
	Not employed, not studying	1
Travel to work (12)	Public transport only	5
	Private transport only	1
	Public & private transport	6
Travel to study (4)	Public transport only	2
	Public & private transport	2
Participates in social activities	Yes	9
	No	4
Travel to social activities (9)	Public transport only	2
	Public & private transport	7

Table 2: Participant profiles

Partici- pant code	Gender	ASD diagnosis	Living arrangement	Employment status	Occupation	Travel to work	Studying for qualificat- ion	Travel to study	Takes part in social activities	Travel to social activities	Data collection method
YA01	female	Asperger	with family	unpaid/voluntary work	warehouse picker	public transport	yes	public transport	yes	public transport	email interview
YA02	female	ASD	with family	paid work	early childhood education	public transport	no	n/a	yes	public & private transport	email interview
YA03	female	Asperger	independently without support	paid work & unpaid/voluntary work	medical receptionist	public & private transport	no	n/a	yes	public & private transport	email interview
YA04	male	Asperger	with family	paid work	assistant manager	public & private transport	no	n/a	yes	public & private transport	email interview
YA05	male	Asperger	with family	not employed	n/a	n/a	no	n/a	yes	public & private transport	email interview
YA06	female	ASD	with family	unpaid/ voluntary work	bookshop assistant	public transport	no	n/a	yes	public & private transport	personal interview

YA07	male	Asperger	with family	not employed	student	n/a	Yes	public & private transport	yes	public & private transport	personal interview
YA08	male	Asperger	with family	paid work	retail assistant	public & private transport	Yes	public transport	no data	public & private transport	personal interview
YA09	male	ASD	with family	paid work	office assistant	public & private transport	no	n/a	yes	public & private transport	discussion group
YA10	male	ASD	with family	paid work	engagement officer	public & private transport	no	n/a	yes	public transport	personal interview
YA11	Unspecified	ASD	with family	paid work & unpaid/voluntary work	student affairs officer, casual tutor, website manager	public & private transport	yes	public & private transport	no	n/a	personal interview
YA12	male	ASD	with family	unpaid/voluntary work	digital document processing	public transport	no	n/a	no	n/a	discussion group

YA13	male	ASD	with family	unpaid/voluntary work	digital document processing	public transport	no	n/a	yes	public & private transport	discussion group
YA14	male	ASD	with family	unpaid/voluntary work	digital document processing	private transport	no	n/a	no	n/a	discussion group

All respondents resided in or regularly travelled in the greater area of Sydney. Two respondents lived independently without support, the remaining 12 lived with their family or caregiver. Seven were in paid employment, five undertook unpaid work, and two did not work. Of the 12 participants who worked, two travelled to work by private car, while the remaining did so either by public transport or a mix of public and private transport. Three respondents were currently studying for a qualification; of these two used both public and private transport to travel to their place of study, while one used only private car. For social activities outside of the home, ten respondents used either public transport only or a mix of public and private transport for this travel, while one used private car only; three respondents did not travel outside of their home for social activities.

3.4 Design

As an exploratory study, the researchers adopted a qualitative approach to data collection and analysis so as to enable participants to provide a rich narrative of their experiences, and thus shape the information according to their own individual experiences, rather than being led by pre-determined possible factors related to their travel experiences (Creswell, 2007).

3.5 Materials

The authors devised a semi-structured interview schedule based on a review of the extant literature on autistic adults' use of public transport. Questions included where the person goes within their community and for what purpose, how often they do this and how and with whom they travel to and from these activities; their positive and negative experiences in using public transport, and the strategies or tools they currently use, or suggest could be helpful, to deal with the issues they experience in accessing and using public transport.

3.6 Procedures

Previous research indicates that offering a choice of modes for participation is an effective enabler in research with autistic adults (Haas et al., 2016). Thus, the online registration asked each participant to select their preferred method of contact with a researcher: face-to-face interview (n=1); telephone interview (n=2); small focus group (n=4); or email interview (n=7) (Opdenakker, 2006). For the email interviews, the researchers conducted these as a series of written questions and responses over a period of one to two days (James, 2007; Meho, 2006). The researchers provided participants with a copy of the interview schedule at least one day before the interview. Email interviews ranged from 860 to 2165 words, at an average of 1250 words. For the group session, with participants' consent, a support worker known to these participants was present.

This session was conducted in an environment familiar to the participants, with appropriate lighting, minimal noise and visual distractions, and comfortable secure seating (Rodger et al., 2014).

Individual interviews – face-to-face, phone and small focus group - ranged from 11 to 34 minutes, at an average of 26 minutes.

3.7 Analysis

A professional transcribing service that employs autistic adults transcribed all interviews and the focus group verbatim from audio recordings to text. Although this was not a grounded theory study where we set out to develop new theory, we used the constant comparative techniques of grounded theory to inductively and deductively analyse the data which also creates a very clear audit trail thus enhancing the trustworthiness of the analysis (Guest et al., 2011). The first author hand-coded the entire set of qualitative data. Initial coding used open coding to allow for themes that were grounded in the data to emerge. Data were then iteratively re-grouped, merged, re-coded and sub-coded to identify and categorise main themes and sub-themes, using the technique of constant comparison (Corbin & Strauss, 2008). Data that on previous coding appeared to be similar and initially coded in one category was subsequently more accurately coded into multiple categories, or re-coded with sub-categories. The first author continued to re-code all data until no new categories or relationships emerged from the data (Charmaz, 2006). To ensure alignment between the raw data and the final coding, the primary author checked the final coding of all qualitative data and a second author checked and verified all data coding until agreement was reached. Trustworthiness was enhanced through co-coding of the first and second authors and continual debriefing within the research team. This ensured the theoretical triangulation of the investigators who all come from various disciplines (psychology, occupational therapy, nursing, social sciences). Furthermore, consensus-driven thematic development and the use of a clear audit trail using the constant comparative method gives the analysis a credible, dependable and confirmable framework.

4. Results

Analysis of the young adults' descriptions of their public transport experiences produced four distinct but inter-related themes: 1) *Anxiety, and the Need for Certainty*; 2) *Spectrum of Confidence*; 3) *Preference for Independence and Self-Reliance*; and 4) *Strategies for Managing*.

4.1 Anxiety, and the Need for Certainty

Anxiety was a predominant issue in the young adults' descriptions of their public transport experiences. Dealing with the unknown or unfamiliar, or the prospect of doing so, was commonly raised as a source of anxiety for these participants. As such, Anxiety was linked to the Need for Certainty.

Undertaking a journey on a new route and/or mode of transport featured as a source of anxiety. The experience of journeying on new route encompassed a multitude of uncertainties and related anxieties that these young adults associated with public transport travel. These included: uncertainty of an unfamiliar schedule for their day; anxiety of waiting for an unfamiliar event to occur such as the impending arrival of the bus/train (will it arrive on time? where is it now? how far away is it?); being in and negotiating an unfamiliar place such as a new bus/train stop (where am I now?); fear of missing the right stop to get off (will I make a mistake?); uncertainty and anxiety about getting to their destination on time; uncertainty and anxiety about how to deal with an unexpected event, including any need that may arise for them to problem solve, and associated with this, the anxiety about dealing with unfamiliar people, such as if they needed to ask for help if they were lost.

"It makes me really quite anxious that I will miss my stop since I do not know where the bus is going, and I don't know which stop to look out for, even if I've looked it up online. I remember avoiding using buses for quite a few years as I did not feel comfortable finding the right stop, since bus routes are less obvious than trains, and you have to ask them to stop." (YA02)

As expressed by one participant, anxiety about the unfamiliar was not essentially about any particular features of public transport, but was an integral part of his emotional repertoire.

"One of the most worrying things for me when I'm doing anything really is the idea of doing something I've never done before. I'm really afraid .- there's always this frame of mind I get into, if I start to feel uncertain about what I'm doing ... where I'm constantly doubting myself."

So, then I get into a very negative train of thought and very negative emotionally, I get very anxious at that point.” (YA07)

Related to their anxiety was the fear of making a mistake and having to deal with the unknown consequences.

“Usually if something makes me want to feel like giving up, it’s the idea of getting things wrong. I tend to leave myself a bit of time where I’m trying to stick to a schedule, so that mistakes won’t end up screwing me over.” (YA07)

In discussing their anxiety, participants expressed a preference for modes of public transport travel that they perceived to offer greater certainty, especially in terms of predictability.

“Trains are more direct, [there are] fewer route options for me to be confused by and if you’re on a train station you get up-to-date information about the progress of the train.” (YA02)

“I don’t like trains ... I don’t like not being able to see where I am.” (YA11)

A number of participants indicated that the anxiety they experienced about the unfamiliar or unexpected aspects of public transport travel impacted the frequency, timing or mode of public transport they used, consequently limiting their accessing of the wider community.

“Sometimes on the weekends, the trains are delayed. In that case, I get too anxious about being late, so I give it a miss. ... Buses make me anxious as they’re slower than trains.” (YA06)

“Having such stressful experiences on new bus trips make me put off trying to learning a new bus route, even if it would make my life easier to catch the bus.” (YA02)

A number of other participants indicated an awareness and acceptance that over time, experience mediated the anxiety that arose from the fear of the unfamiliar.

“When I’m trying to find the nearest bus stop or train station to where I am or when I’m trying to understand when to get off a train or bus, if I’m doing it for the first time it tends to be difficult for me. But after the first time and as I get more experience in it, it becomes more familiar. It becomes a lot easier, I get used to it.” (YA07)

This acceptance of the effect of experience was one of a range of managing mechanisms (discussed in more detail in *Strategies for Managing* below) that participants used to enable them

to journey on public transport despite their anxiety about doing so. In addition to dealing with uncertainty, some participants also specifically reported sensory issues as another direct source of anxiety in their public transport travels. Others reported sensory issues as a source of discomfort or annoyance on public transport. Sensory issues commonly cited as being experienced on public transport were balance and motion sickness, noise, tactile sensation, lights and smell. Participants reported that sensory issues influenced their preferred mode of transport, and the chosen time of travel.

“Some underground train stations have LED advertising screens, and I find them painful to look at because they are too bright. I am also bothered by flickering from fluorescent tubes, both the normal flickering and the kind that happens when a tube is about to fail. Sometimes, I find that the announcements at train stations are too loud. The lift to the platforms at Central also makes weird noises. On any mode of public transport, there are sometimes people who wear too much perfume or other scented products. I sometimes get motion sickness on buses.” (YA04)

Being near and around other people was a source of multiple sensory issues including noise, smell and touch, together with other autism-related issues for participants, including the need for personal space, fear of unwanted social contact, and information overload. For some participants, the need for personal space was problematic due to the large crowds in and around public transport, while for others, simply being in proximity to other people, such as sitting next to another unfamiliar person and anticipation of unintended physical contact on a bus was stressful.

4.2 A Spectrum of Confidence

Participants reported varying degrees of confidence in their ability to undertake independent public transport travel. A number of participants portrayed an image of a calm and confident independent public transport traveller. This extended to their confidence in managing any anxiety or sensory issues they may experience on public transport.

“I’m pretty good at using both trains and buses. If I needed to go somewhere new and had to catch a new bus route that I have never caught before, I can work that out pretty well usually.” (YA05)

Some participants expressed confidence with particular aspects of public transport travel.

“Going somewhere new, getting on and getting off and finding the right station - I’m actually quite good at navigating, as long as I have my GPS and I check beforehand. ... If I had to

ask somebody at a station or on a bus or something for help, I know where to go to. And it's all visually based, and very, very simple.” (YA10)

When participants did express a lack of confidence, it concerned their ability to independently journey on a new route. In these cases, participants commonly cited the need for support or help to take a new route.

“Mum usually does (help me before I start my journey). She'll go with me the first few times. Or sometimes I'll meet a friend somewhere if we're catching up.” (YA06)

4.3 A Preference for Independence and Self-Reliance

For their regular public transport journeys, all participants generally travelled alone, and many expressed a preference to travel independently. Some participants also described how when dealing with an issue in their public transport travels, they preferred to first to draw on their own resources (including those of their close support circle) rather than seek 'external' help. Some described how their preference for independence and self-reliance was related to their need for independent physical and mental space. Others described how their self-reliance was a result of learning to live with their autism.

“I prefer travelling by myself mainly because it's a lot of energy communicating with everyone and I need the down time.” (YA10)

“I don't need to ask for help. I rely on the Tripview app and I can figure most stuff out myself. I would just – I could just do it. Yeah – figure it out myself. They've got the signs up there. It's not hard.” (YA05)

4.4 Strategies for Managing

Finally, participants described a range of strategies they employed to deal with issues such as anxiety, intolerance of uncertainty, social stress, sensory preferences, information overload and executive functioning, so as to enable their public transport travel. The strategies most commonly described were seeking help from their support circle, using technology, planning ahead and using music/headphones. Other strategies included allowing extra time for trips, preparing scripts for social situations and avoiding travel at certain times or on certain modes of transport.

“If I know I am going on public transport in peak hour I take my headphones with me to shut out some of the noise (and communicate to others I don't want to be interrupted), and I allow myself some time afterwards to wind down by myself. It also helps me know that if I'm

going somewhere new and may have to ask for help that I can think of a few scripts that might fit beforehand, which helps me get less flustered the rest of the trip.” (YA02)

A common strategy to deal with the anxiety of taking and learning a new route was to have a family member or friend journey with them as a travel companion. Others strategies involving their family were seeking help from a family member to plan trips ahead of time, and contacting a family member during a public transport trip for information and help to deal with an unexpected event or solve a problem that had arisen during the trip.

“When I’m taking a new trip, my mum or my sister usually help me to get information about routes, which type of transport will best for your trip, timetables, and prices, and plan my trips on public transport.” (YA06)

“Occasionally I ask my dad which bus is best to catch [and] I can always call my dad so I feel okay about it.” (YA11)

All participants described sourcing online information via some form of personal technology to enable them to manage and make decisions about their public transport trips. In many cases, this information enabled them to plan ahead, and thus provided greater certainty.

“When I’m on the buses I usually keep my phone’s GPS on to track where I am and how far I have to go until the stop. ... I can always get off at the next stop and use my GPS to figure out what to do next.” (YA11)

“I’m reliant on my phone and the Tripview app. On my phone, the information is easier for me to understand. At the platform, the information can be too much, so you might not know when to get off there.” (YA08)

5. Discussion

In providing a thematic content analysis of the self-reported public transport experiences of 14 young autistic adults, the present study highlights a number of key issues that these young people face in undertaking independent public transport travel. Most importantly, the findings identify the often dominant role that anxiety plays in the public transport experiences of young autistic adults. Furthermore, the findings point to the reciprocal relationship between anxiety and uncertainty, which appear to be interceded by experience, confidence, and a range of strategies deployed by these individuals to manage situations they find stressful in undertaking public transport travel. The findings also highlight the role of sensory processing in evoking anxiety for young autistic adults travelling on public transport.

Anxiety is well-established as a central experience in the lives of many autistic people across all ages (Lever & Geurts, 2016, White et al., 2009). It is estimated that most autistic individuals show anxiety at levels that significantly impact on their daily functioning (Maisel et al., 2016).

Recent research confirms that adults with a diagnosis of autism are more likely to report severe, versus minimal anxiety symptoms compared with adults without an autism diagnosis. (Murray et al, 2019). In relation to our sample of young adults on the autism spectrum, Murray et al (2019) also indicate that anxiety in autistic adults is associated with lower age, increased self-reported autism symptom severity, and is marginally more elevated in females, with this elevation being most evident in women in who are in young to middle adulthood.

The multiple sources of anxiety reported by this study's participants in their public transport experiences, including unexpected change, sensory disturbances, unknown consequences, and the need to interact with unfamiliar environments, people and experiences, support the findings of other researchers (e.g. Trembath et al, 2012) which implicate the strong desire for routine and sameness, and sensory issues as key causal factors in the presentation of anxiety in young autistic adults.

Other recent work provides emerging empirical evidence for intolerance of uncertainty as a framework for understanding anxiety in autism and associated factors such as emotion regulation, sensory function and restricted and repetitive behaviours (Maisel et al., 2016; Boutler et al., 2014; Cai et al., 2017; South & Rogers, 2017; Wigham et al., 2015). The findings of the current study provide further qualitative support that intolerance of uncertainty influences anxiety in the everyday lived experiences of autistic people when navigating an anxiety-provoking activity such as using

public transport. Furthermore, our findings point towards a relationship between sensory functioning and intolerance of uncertainty and anxiety (Cai et al., 2017; Wigham et al., 2015).

In general, public transport travel is characterised by complex decision-making for the individual traveller, particularly at times of unexpected events or service disruption. For autistic individuals, the experience of using public transport can be even more anxiety provoking, given that making everyday life decisions are exacerbated by their higher levels of anxiety (Luke et al., 2011). This points to the very real impact of anxiety on the capacity of young autistic adults to independently undertake public transport travel.

A number of specific findings of this study contrast with those of previous research on the experience of people on the autism spectrum and other developmental disabilities, while other specific findings add weight to previous research. Falkmer et al. (2015), utilising Q-methodology, reported that autistic adults were able to learn new routes easily, were proficient in knowing when to get off the bus or train and only occasionally felt anxious when services ran late. However, the young autistic adults in our study reported these situations as being significant points of uncertainty and consequently a source of anxiety, consistent with findings from research conducted with individuals with cognitive functional limitations (Risser et al., 2015) and intellectual disability (Davies et al., 2010).

In addition, while Falkmer et al. (2015) also found that their participants did not report specific sensory aspects as barriers to public transport use, participants in our current study reported a wide range of sensory issues as influencing their patterns of public transport use, including their choice of mode of transport, and the time and frequency of travel. In contrast to the dependence on family members and others to plan and provide transport found by Deka et al. (2016) with autistic adults, participants in the current study expressed a much greater degree of independence; instead actively seeking help from family members to plan and problem solve as an overt mechanism for enabling and managing their independent travel on public transport. These differences point to the heterogeneity of the autistic population, and the value in undertaking larger scale research encompassing the broad spectrum of autism in adulthood to investigate these issues in more depth.

Similarities of this study's findings with those in previous research include the negative impact of crowding (Falkmer et al., 2015; Ståhl & Månsson Lexell, 2017) and employing a range of strategies and tools to enable independent public transport travel (Lubin & Feely, 2016) including travelling with a companion (either a family member or friend) to alleviate anxiety, and planning trips in advance to decrease feelings of stress (Ståhl & Månsson Lexell, 2017). Future research could

further investigate ways in which autistic adults believe public transport can be improved for their use and the coping strategies they employ to overcome barriers, as this information will help inform the development of innovative solutions, such as providing dynamic online information and the development of smart phone applications.

5.1 Limitations

The current study reported on the viewpoints of a small sample comprising 14 young autistic adults. All data were collected from the population of one major city in Australia (Sydney) and so the results may not be reflective of experiences in other cities. As such, the generalisation of the findings are limited. Nevertheless, that we recruited a reasonably heterogeneous sample of young adults is a strength of the study and enhances the transferability, and hence trustworthiness, of the study. Another limitation is the potential for premature cessation of data collection; some researchers argue that the concept of saturation is arbitrary and may never truly occur (Corbin & Strauss, 2008). Thus, it is plausible that 14 interviews were insufficient to gain an exhaustive account of experiences and further data collection may have revealed new information. In addition, bias may have been introduced due to assumptions built on the researchers' knowledge and experience. It is believed that the fewer the preconceived notions, the less chance of bias (Streubert, 2011). In responding to the invitation to participate in the research, participants displayed a degree of independence and sufficient confidence in their capacity to communicate with a researcher in an interview, thus the views of people with higher support needs in undertaking public transport travel are likely to be missing. The current study employed several data collection techniques including face-to-face interviews, telephone interviews, and small focus group which require participants to be willing and comfortable to take part in some form of social contact with the interviewer during the process of data collection. However, the inclusion of email interviewing as an option did enable those with a preference for limited personal contact to take part.

5.2 Implications

Findings from the present study point towards a triad of factors that make the use of public transport stressful for young autistic adults: 1) their propensity to be intolerant of uncertainty; 2) the dominant role that anxiety plays; and 3) the impact of sensory processing, particularly the impact of crowding and associated tactile, auditory, and visual stimuli. These findings suggest that intolerance of uncertainty may invoke an anxious response or exacerbate pre-existing anxiety of autistic adults, and sensory processing may mediate this relationship. To better understand the exact nature of the relationship between these factors, the findings of the present study need to be

tested in a large sample, using a combination of observation, qualitative measures, and quantitative data.

These findings add to our understanding of the key issues faced by young autistic adults in using public transport in a large metropolitan city, and how they experience and deal with these issues. This understanding is essential to inform the development of effective supports that can enable and enhance their independent use of public transport. A key to developing such supports could lie in the finding that all participants in this study reported using some form of personal technology to aid their use of public transport use - in this case, to source online public transport information. Interestingly, existing research provides good evidence for the role of online public transport information in allaying uncertainty and anxiety. For example, from their study of public transport use by older people and people with functional limitations, Waara et al. (2013) conclude that “...*the substantial influence of online traveller information services is the empowerment of travellers who are anxious and insecure before a journey. These travellers can, through better access to traveller information offered by online traveller information services, find what they need to build their confidence before a journey.*”

Given the findings of the present study, the benefits of online travel information in empowering the uncertain traveller through reassurance and confidence could be equally applicable to autistic individuals. With the use of smart phones becoming commonplace, this benefit could extend to in-transit sourcing of information, particularly during service disruptions or other times of uncertainty. In the light of this study, the potential utility of a smart phone applications to help young autistic adults, and perhaps other young adults with related disabilities, enjoy the successful independent use of public transport in their everyday life is one form of support that merits investigation.

6. References

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