How do restricted and repetitive behaviours influence the participation of children with autism in school contexts?

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Keywords

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Abstract

Background: Restricted and repetitive behaviours and interests are one of the two core diagnostic features of autism. Frequent, severe restricted and repetitive behaviours and interests can cause significant difficulties for individuals with autism. These behaviours can impede participation in activities at home and in the community and affect social interaction. To date, there is little research into the effects of restricted and repetitive behaviours and interests in the school environment. This study aimed to document the effects of restricted and repetitive behaviours on participation for children with autism.

Method and Results: The data used in this study has been collected through the Cooperative Research Centre for Living with Autism’s (Autism CRC) Longitudinal Study of Australian children with Autism (LASA). Caregivers of children on the spectrum aged 9–10 years (n = 131) completed the Participation and Environment Measure for Children and Youth school section and the Developmental Behavioural Checklist- Parent Version. Caregivers reported on frequency of child's participation and level of involvement in school activities and the amount and frequency of restricted and repetitive behaviours. Analysis was performed using a series of Mann-Whitney U tests at PEM-CY item-level which revealed that children with elevated lower order restricted and repetitive behaviours participate less in getting together with peers outside of class.

Conclusion: Lower order restricted and repetitive behaviours affect participation in socialising with peers. This is concerning as limited or absent peer relationships can negatively influence health and mental health. Further investigation is warranted through multi informant designs that seek the perspectives of the child and education specialists.
Acknowledgements

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Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Sally Ryan
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<td>ADHD</td>
<td>Attention Deficit and Hyperactivity Disorder</td>
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<td>APA</td>
<td>American Psychiatric Association</td>
</tr>
<tr>
<td>ASD-ENA</td>
<td>Autism Spectrum Disorder Educational Needs Analysis</td>
</tr>
<tr>
<td>Autism CRC</td>
<td>Cooperative Research Centre for Living with Autism</td>
</tr>
<tr>
<td>DBC-P</td>
<td>Developmental Behaviour Checklist- Parent Report</td>
</tr>
<tr>
<td>fPRC</td>
<td>Family of Participation-related Constructs</td>
</tr>
<tr>
<td>ICF</td>
<td>International Classification of Functioning, Disability and Health</td>
</tr>
<tr>
<td>IQ</td>
<td>Intelligence Quotient</td>
</tr>
<tr>
<td>LASA</td>
<td>Longitudinal study for Australian Students with Autism</td>
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<tr>
<td>NCCD</td>
<td>National Consistent Collection of Data</td>
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<tr>
<td>OCD</td>
<td>Obsessive Compulsive Disorder</td>
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<tr>
<td>PEM-CY</td>
<td>Participation and Environment Measure- Children and Youth</td>
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<tr>
<td>RBQ-2</td>
<td>Repetitive Behaviour Questionnaire-2</td>
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<tr>
<td>SPSS 23</td>
<td>Statistical Package for the Social Sciences 23</td>
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1. Introduction

1.1 Background

Autism spectrum disorder (ASD), herein referred to as autism, is a neurodevelopmental disorder that is defined by the Diagnostic Statistical Manual of Mental Disorders- Fifth edition (DSM-5; American Psychiatric Association, 2013) as a dyad of restricted and repetitive behaviours and interests, and social and communication difficulties as the core impairments (Harrop et al., 2014). Restricted and repetitive behaviours (RRBs) and interests were among the first characteristics of autism described by Kanner (1943). These behaviours are not specific to this developmental disorder, as they are also observed in children and adults with other developmental disorders (Langen, Durston, Kas, van Engeland, & Staal, 2011; Uljarevic et al., 2017) and in typically developing young children (Arnott et al., 2010; Barber, Wetherby, & Chambers, 2012). However, in individuals with autism the behaviours are frequent, and always combined with characteristic social communication difficulties (Joseph, Thurm, Farmer, & Shumway, 2013; Mandy, Charman, Gilmour, & Skuse, 2011).

Restricted and repetitive behaviours have been commonly grouped into two distinct, but not mutually exclusive categories (Georgiades, Papageorgiou, & Anagnostou, 2010; Papageorgiou, Georgiades, & Mavreas, 2008; Szatmari, Georgiades, & Bryson, 2006; Turner, 1999). These groups are lower order behaviours related to repetitive sensory movement; and higher order behaviours related to insistence on sameness (Bishop et al., 2013; Georgiades et al., 2010; Mooney, Gray, & Tonge, 2006; Papageorgiou et al., 2008; Richler, Bishop, Kleinke, & Lord, 2007; Richler, Huerta, Bishop, & Lord, 2010; Szatmari, Bryson, Boyle, Streiner, & Duku, 2003). An additional study by Lam, Bodfish, and Piven (2008) found evidence for a third subgroup called circumscribed interests that also feature alongside insistence on sameness as higher order behaviours.
The lower order behaviour group contains repetitive sensory motor behaviours. These behaviours can present as rocking and hand flapping (Boyd et al., 2010), spinning around, and self-injurious behaviour such as skin picking and head banging (Soke et al., 2018). These behaviours are thought to become less severe over the lifetime of an individual (Esbensen, Seltzer, Lam, & Bodfish, 2009). This particular category of lower order behaviours has been found to be more prevalent and severe in children with lower cognitive ability (Bishop et al., 2013; Boyd, McBee, Holtzclaw, Baranek, & Bodfish, 2009; Lam & Aman, 2007).

Insistence on sameness behaviours, part of the higher order behaviour group, are described as behaviours that are exhibited when individuals have difficulties with change to routine (Kim & Lord, 2010). People with autism may sometimes create rituals in order to cope with the unpredictability of their surroundings (Dewrang & Sandberg, 2011). Circumscribed interests, also higher order behaviours, are defined as behaviours such as object attachment and repetitive language (Cho et al., 2017; Watt, Wetherby, Barber, & Morgan, 2008). These interests can also be intense preoccupations (Boyd, Conroy, Mancil, Nakao, & Alter, 2007; Lam et al., 2008) such as amassing large amounts of information on unusual topics (Klin, Danovitch, Merz, & Volkmar, 2007). Higher order behaviours like these are more likely to be observed in individuals with higher cognitive abilities (Bishop, Lord, & Richler, 2006; Joseph et al., 2013; Watt et al., 2008).

1.2 Significance

1.2.1 Inclusion. Autism is a spectrum and individuals have varied profiles and severities of different restricted and repetitive behaviours (Boyd, McDonough, & Bodfish, 2012). Understanding these behaviours is important because of their adverse impact on adaptive behaviour (Baker, Lane, Angley, & Young, 2008; Kirby, Boyd, Williams, Faldowski, & Baranek, 2016; Lane, Young, Baker, & Angley, 2010), and the negative association with frequency and quality of participation in activities (Dickie, Baranek, Schultz,
RESTRICTED AND REPETITIVE BEHAVIOURS AND PARTICIPATION AT SCHOOL

Watson, & McComish, 2009; Hochhauser & Engel-Yeger, 2010). The effect of restricted and repetitive behaviours on school participation is not well understood and requires investigation.

There is growing evidence of the difficulties that students with autism are facing in school settings. In 2015, the National Consistent Collection of Data (NCCD) identified 18 per cent (674,323 students) of all Australian school students as receiving an educational adjustment due to disability (Education Services Australia, 2016). According to the Australian Bureau of Statistics (Australian Bureau of Statistics [ABS], 2017) of the children diagnosed with autism attending mainstream schools, it was found that 83.7 per cent experienced difficulties in their place of learning. Students reported that their main areas of difficulty were fitting in socially (63.0%), learning difficulties (60.2%) and communication difficulties (51.1%) (ABS, 2017). It is reported that educational outcomes for children with autism at school (Ashburner, Ziviani, & Rodger, 2010; Roberts & Simpson, 2016) and after they leave (Howlin, Savage, Moss, Tempier, & Rutter, 2014; St. John, Dawson, & Estes, 2018) are poor compared to their typically developing peers and those with other disabilities. Outcomes are also poor in relation to the cognitive ability of students with autism, that is they underachieve in relation to their cognitive ability (Keen, Webster, & Ridley, 2016).

While inclusion of children with autism in mainstream classrooms is generally supported by educators, they find it difficult to successfully include students with autism in their classrooms (Lindsay, Proulx, Thomson, & Scott, 2013), most likely because inclusion of children with disabilities remains one of the least understood areas of education (Symes & Humphrey, 2010). A lack of provision of autism specific adaptations and autism specific training for teachers (Roberts & Simpson, 2016) can result in limited effective inclusive practice. An ASD educational needs analysis (ASD-ENA) conducted in 2015 obtained information about the educational needs of students with autism in Australia (Saggers et al.,
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2015). The study used perspectives from 1468 respondents from four key stakeholder groups; educators, parents, specialists and students with autism aged 11-18 years. The ASD-ENA study found that social emotional needs had the most impact followed by behavioural needs in educational settings. They also discovered that after funding, the key barriers to supporting the challenging and complex needs of students with autism were lack of time, lack of education and training, and lack of specialist support.

The characteristics of autism present unique difficulties for successful participation and need to be examined (Simpson, Keen, Adams, Alston-Knox, & Roberts, 2017). It is noted that students with autism have difficulties with self-control and hyperactivity, assertion and cooperation (Macintosh & Dissanayake, 2006). Active participation in educational settings is difficult because they are less likely to answer questions out loud or work collaboratively with peers (Vakil, Welton, O’Connor, & Kline, 2009).

Children who display high levels of restricted and repetitive behaviours and interests fail to learn simple discrimination tasks whilst engaging in this behaviour (Koegel & Covert, 1972). Additionally, when individuals are engaged in restricted and repetitive behaviours and interests they have been found to be less able to physically participate in leisure activities in the home and in the community (Hilton, Graver, & LaVesser, 2007; Hochhauser & Engel-Yeger, 2010; LaVesser & Berg, 2011). Information about how restricted and repetitive behaviours impact on school participation is needed to enable adjustments to be made to the learning environment and the delivery of curriculum, to assist children and young people and their families in achieving success during their schooling career.

1.3 Context

1.3.1 Participation. The publication of the International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY) by the World Health Organisation in 2001 has increased global interest in participation for children with
disabilities (World Health Organisation [WHO], 2001, 2007). Participation is considered to have a positive influence on an individual’s health and wellbeing and plays a role in learning new skills and developing relationships (Anaby et al., 2014; Khetani et al., 2014). It is recognised that children with disabilities can form close friendships, acquire life skills, competencies and creativity, and achieve mental and physical health by participating in different activities (Anaby et al., 2014; Jeong, Law, Stratford, DeMatteo, & Kim, 2016). Full participation in day to day activities and routines is considered to be the ultimate indicator of health and functioning (WHO, 2007). In addition, occupational engagement is understood to lead to the achievement of intellectual, health, communicative, and social potential (King et al., 2003; Tanner, Hand, O’Toole, & Lane, 2015).

Research investigating children with autism who engage in restricted and repetitive behaviours in terms of participation in the school context requires an understanding of the constructs of both restricted and repetitive behaviours and participation. Whilst restricted and repetitive behaviours and interests are well defined, there has been confusion about the definition of participation in studies, which has led to varied descriptions of the concept (Granlund et al., 2012) and therefore mixed approaches to measurement. This has caused misinterpretation of results found and reported (Imms et al., 2016).

Imms et al. (2016) reviewed the language, definitions and intervention research around the construct of participation with the aim of understanding how participation is viewed by other researchers. Attendance and involvement were found to be the two themes that were explicitly linked with the experience of participation, with attendance a prerequisite for involvement (Imms et al., 2016). However, participation is a multidimensional construct (Granlund et al., 2012; Imms et al., 2017) that also includes related concepts of preference, activity competence and sense participation. Additionally, all participation occurs within a
contextualised setting (Anaby et al., 2014; Hammel et al., 2008; Mallinson & Hammel, 2010).

There is growing evidence to show that there are intricate links between participation, restricted and repetitive behaviours and context. It is becoming clear that the effect of context in general on restricted and repetitive behaviours and interests is a complex combination of intrinsic factors, such as level of anxiety, and environmental factors such as what is happening, or who is involved (Joosten et al., 2009, 2012). Therefore, the focus for successful participation in school for children who engage in restricted and repetitive behaviours and interests needs to be considered from a bioecological and holistic viewpoint, with a shift from fixing the behaviours through intervention, without discounting this approach altogether, to the consideration of environmental adjustments to reduce the chances of occurrence (Ashburner et al., 2008; Brown & Dunn, 2010; Joosten et al., 2012; Kirby et al., 2016).

1.4 Purpose and Research Question

To date there has been limited research on the impact restricted and repetitive behaviours and interests can have on daily functioning, compared to the research conducted into social and communication difficulties (Berry, Russell, & Frost, 2018). Studies have predominantly focused on definition, change and cause (Leekam, Prior, & Uljarevic, 2011) and consists of clinical observations, or anecdotal reports with very few being in natural contexts (Kirby et al., 2016). No studies of restricted and repetitive behaviours focus on the effects of participation in education. Exploration of literature focusing specifically on participation for children with autism also confirms that these two subject areas have not been researched together. Further research is required to identify the way restricted and repetitive behaviours affect participation in order to create effective treatments for students
with autism that promote active engagement within educational settings (Sparapani, Morgan, Reinhardt, Schatschneider, & Wetherby, 2016).

The Family of Participation-related Constructs (fPRC; Imms et al., 2016) provides a conceptual framework for this study, from which to examine the interaction between the factors of restricted and repetitive behaviours and participation within the context of school. The fPRC also provides a classification of participation that gives clarity and uniformity. This enables comparisons between the proposed study and other studies using the same definition.

The main purpose of this study is to develop a specific understanding of the effect of restricted and repetitive behaviours on school participation for children with autism through data collection and analysis. This potentially will assist to identify ways to remove the barriers restricting attendance and involvement for students with autism in mainstream schooling. Therefore, the following research questions were formulated for this study:

How do restricted and repetitive behaviours influence the participation of children with autism in school contexts?

This will be addressed by two sub-questions:

Research sub-question 1: How do differing levels of restricted and repetitive behaviours influence attendance and involvement of children with autism in school activities?

Research sub-question 2: How do differing types of restricted and repetitive behaviours influence attendance and involvement of children with autism in school activities?

2. Literature Review

A systematic approach was required when examining the relevant research in the areas of school participation and restricted and repetitive behaviours in children with autism,
due to the volume of literature available. After an initial search of the literature through data bases such as CINAHL®, ERIC®, PsychINFO®, PubMed®, SAGE Journals Online®, ScienceDirect® and SpringerLink® it was apparent that there is considerable research into participation and also research into restricted and repetitive behaviours. However, it became clear that there was no literature that addressed the relationship between restricted and repetitive behaviours and school participation for students with autism. The two main categories observed were restricted and repetitive behaviours in autism, and participation for individuals with autism. Therefore, the exploration of the research was divided into these two areas. Links, relationships and overlaps were discovered between the two categories, along with clear gaps in the research. This extensive search then led to the identification of the aforementioned research questions.

2.1 Research on Autism and Restricted and Repetitive Behaviours

Autism is a neurodevelopmental disorder that is estimated to affect between one to two and a half percent of children globally (Kim et al., 2011; Randall et al., 2016). The increase in reported prevalence is worldwide. Possible explanations include under diagnosis in the adult population, causing previous rates of prevalence to be underestimated. It is also possible that the increase in diagnosis is due to the rising awareness of the disorder by health care professionals and the general public (Duchan & Patel, 2012). Additionally, the increase in prevalence could be explained by the changing diagnostic criteria of autism as knowledge evolves (Mahjouri & Lord, 2012). This increase has placed a huge demand on services such as early intervention programs (Wise, Little, Holliman, Wise, & Wang, 2010) and presents great challenges to the educational system (Crosland & Dunlap, 2012).

The Diagnostic Statistical Manual of Mental Disorders 5th edition (DSM-5; APA, 2013) consolidated the classifications of autistic disorder, Asperger’s disorder, childhood disintegrative disorder and pervasive neurodevelopment disorder not otherwise specified into
the category of autism spectrum disorder. This supports the structure of a continuum of expression from mild to severe (Lauritsen, 2013; Young & Rodi, 2014) rather than distinct disorders. The previous triad of symptomology: impairments in social interaction, impairments in communication and restricted repetitive and stereotyped patterns of behaviour, interests, and activities was reclassified as a dyad: impairments in social and communication, and restricted and repetitive patterns of behaviour, interests, or activities (Young & Rodi, 2014). The diagnostic section of social and communication impairments is divided into three areas; deficits in social-emotional reciprocity, deficits in nonverbal communicative behaviours used for social interaction and deficits in developing, maintaining, and understanding relationships (APA, 2013). Under the core diagnostic criteria of restricted and repetitive patterns of behaviour, interests, or activities there are four subcategories: stereotyped or repetitive motor movements, use of objects or speech; insistence on sameness, inflexible adherence to routines, or ritualised patterns of verbal or non-verbal behaviour; and highly restricted, fixated interests that are abnormal in intensity or focus. A new category of atypical sensory behaviours was also introduced. To receive a diagnosis, a person needs to demonstrate at least 2 of these 4 behaviours. The DSM-5 further classifies both core diagnostic areas by levels of severity based on the impact they have on an individual’s ability to function in daily living (Table 1).
Table 1.

*Classification of Severity Levels of Restricted and Repetitive Behaviours*

<table>
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<th>Severity Level</th>
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<tr>
<td><strong>Level 3- Requiring very substantial support</strong></td>
<td>A level three severity rating indicates that due to their debilitating restricted and repetitive behaviours and interests, individuals require very substantial support to function on a daily basis. They display marked distress when rituals or routines are interrupted, and it is very difficult to redirect from a fixated interest or return to it quickly.</td>
</tr>
<tr>
<td><strong>Level 2- Requiring substantial support</strong></td>
<td>People with level two severity of restricted and repetitive behaviours and interests have more frequent displays of behaviours that are noticeable to others. These behaviours cause difficulties in functioning over multiple contexts. Distress or frustration is apparent when RRB’s are interrupted; difficult to redirect from fixated interest.</td>
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<tr>
<td><strong>Level 1- Requiring support</strong></td>
<td>Individuals require some support in their day to day functioning and engage in inflexible behaviours that interfere in one of more contexts. This includes having trouble with transitions, planning and organisation and resisting attempts by others to interrupt RRB’s or to be redirected from fixated interest.</td>
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Children with autism engage in restricted and repetitive behaviours on a daily basis and these behaviours are a part of everyday experiences of the individuals and their families (Baranek, David, Poe, Stone, & Watson, 2006; Dunn, 2007; Leekam, Prior, & Uljarevic, 2011). However, restricted and repetitive behaviours are far less researched, and less is known about their aetiology and development (Harrop et al., 2014). The majority of research to date has focused on the types and frequencies of restricted and repetitive behaviours with minimal exploration of these behaviours in context (Kirby, Boyd, Williams, Faldowski, & Baranek, 2016). There has been some research regarding atypical sensory responses, now under the umbrella of restricted and repetitive behaviours in the DSM-5. Therefore, in this research the three other subcategories of stereotyped or repetitive motor movements, insistence on sameness, and circumscribed interests, will be considered.

2.2 Definition

Restricted and repetitive behaviours can be divided into three subcategories: repetitive sensory motor movements, insistence on sameness and circumscribed interests. Repetitive sensory motor movements, also referred to as stereotypy (Chebli, Martin, & Lanovaz, 2016; Cunningham & Schreibman, 2008; Lanovaz, Robertson, Soerono, & Watkins, 2013) can comprise of behaviours such as hand, finger and whole-body movements, (e.g. hand flapping, stereotyped body movements, spinning, jumping, rocking) (Szatmari et al., 2006). Hand and finger flapping can be an expression of excitement in younger children, whereas complex whole-body movements such as rocking may also be associated with agitation and function as self-calming. Repetitive sensory motor behaviours can also include repetitive use of objects, or parts of objects such as flicking elastic bands or twirling a stick, repetitive activities involving the senses such as touching or smelling (Joyce, Honey, Leekam, Barrett, & Rodgers, 2017) and repetitive vocalisations (Bodfish, Symons, Parker, & Lewis, 2000; MacDonald et al., 2007). Self-injurious behaviours also fall under this category and can
present as hitting, self-biting (Buono, Scannella, & Palmigiano, 2010; Richards, Oliver, Nelson, & Moss, 2012), head banging, skin picking and eye gouging (Rice et al., 2016). All of these repetitive sensory motor behaviours have the potential to prevent children from physically engaging in school activities.

Insistence on sameness behaviours can often present as compulsions and/or rituals and difficulties with changes in routines (Factor, Condy, Farley, & Scarpa, 2016). Frequent changes of schedule can cause challenging behaviours due to preference for sameness in many individuals with autism (Richler et al., 2007). With a typical school day being full of changes in schedule or activities, this could make it difficult for children with autism, who prefer rigid routines, to participate. Insistence on sameness can also mean that individuals with autism find it hard to manage changes to their physical environment, including the presence or absence of particular people. This could cause difficulties in the classroom setting when a relief teacher has to take the class, or a familiar teacher aide or support teacher are not available. In particular, the marked distress people with autism show when routines are changed is unusual and can be disruptive and detrimental to everyday activities.

The presence of restricted and repetitive behaviours and interests, particularly insistence on sameness, may limit home, leisure and classroom participation (Richler et al., 2010) and changes in schedules or activities may also cause involvement in problematic behaviours (Richler et al., 2007; Sparapani, Morgan, Reinhardt, Schatschneider, & Wetherby, 2016). Children may also have difficulty shifting attentional focus, which has implications for individuals with autism in the classroom when facing daily transitions from one activity to another (Sparapani et al., 2016). People with autism may also demonstrate a rigid preference for particular types of food (e.g. certain colours only) and types of clothing (e.g. particular brand, fabric). Routines may be required to be carried out with precise detail. Some
people with autism can also have verbal rituals where they require the same answer to the same question repeatedly (Factor et al., 2016).

Circumscribed (also known as restricted) interests are abnormal in intensity and/or focus (APA, 2013). They can develop as early as two to three years of age (Bashe & Kirby, 2001) and are seen in 75-95% of children with autism (South, Ozonoff, & McMahon, 2005; Turner-Brown, Lam, Holtzclaw, Dichter, & Bodfish, 2011). Circumscribed interests fall into two categories: acquisition of knowledge, and collections. The subjects of interest in both groups can range from common topics such as trains (Winter-Messiers, 2007) to unusual topics, such as fans or lawnmowers. The amount of time dedicated to special interests can cause considerable disruption to the daily life of a person with autism and their family (South et al., 2005). Children who are only interested in their topics of choice can be difficult to engage in other activities, which can cause challenges in the classroom. Additionally, individuals with autism may only want to converse with others about their specific topics of interest, which can lead to challenges with reciprocal social interactions (Boyd et al., 2007). However, these special interests can also provide intellectual enjoyment and be used constructively to facilitate learning and friendships (Mottron, 2017).

2.3 Higher and Lower Order Restricted and Repetitive Behaviours

Restricted and repetitive behaviours and interests have been further categorised into two separate, but not mutually exclusive, groups (Szatmari et al., 2006; Turner, 1999) of lower and higher order behaviours (see Figure 1). Lower order behaviours are considered to be unusual sensory interests and repetitive motor behaviours such as hand and finger mannerisms, stereotyped body movements and repetitive use of objects (Szatmari et al., 2006). Higher order behaviours were initially identified and were grouped into two clusters; insistence on sameness and circumscribed interests (Spiker et al., 1994). Further to this, using exploratory factor analysis, (Lam et al., 2008) found evidence for another higher order
behaviour, a third distinct category of behaviours called circumscribed interests, shown in figure 1, which present as abnormal preoccupations and unusual/intense attachments to subjects and objects (Lam et al., 2008).

**Figure 1. Higher and lower order restricted and repetitive behaviours.**

Lower order behaviours have been found to be associated with lower nonverbal and verbal IQ (Bishop et al., 2006; Kim & Lord, 2010; Lam et al., 2008) and lower chronological age (Leekam et al., 2007). Stereotypy, or repetitive motor and vocal behaviours, can be defined as involuntary, patterned, rhythmic and non-reflexive behaviours that are not caused by social stimuli (Freeman, Soltanifar, & Baer, 2010; Rapp & Vollmer, 2005). Some repetitive motor behaviours provide strong sensory feedback and are sometimes referred to as
repetitive sensory and motor behaviours (Richler et al., 2007). It is important to note that not all repetitive motor behaviours provide this sensory experience and should not be confused with atypical sensory reactions. Overwhelming sensory experiences may trigger restricted and repetitive behaviours and interests, and it is known that sensory features and restricted and repetitive behaviours and interests co-occur (Leekam et al., 2011) however there is a clear conceptual difference.

Higher order behaviours include insistence on sameness; for example, the need to maintain routines and rituals, wear the same clothing, or insist on particular foods. Circumscribed interests are described as intense and unusual preoccupation with particular objects or topics and are often pursued to the exclusion of other activities. They are also considered to be more complex, higher order behaviours and are usually associated with individuals with higher cognitive ability (Bishop et al., 2006; Joseph et al., 2013; Watt et al., 2008), although Turner-Brown et al. (2011) found in their study that circumscribed interests were not associated with intelligence. Circumscribed interests also seem to increase in intensity over an individual’s lifespan (South et al., 2005).

This research gives us clear definitions and begins to explore the difficulties that restricted and repetitive behaviours can create in daily living for individuals with autism. However, studies in this area of definition do not discuss in detail how these behaviours affect individuals. The research does not measure the number of restricted and repetitive behaviours, and these behaviours are not considered in context.

2.4 Change

As previously stated, research into the domain of restricted and repetitive behaviours has been historically underrepresented. Whilst there has been an increase in studies over the past decade, these developments have taken place in a number of different fields, resulting in a lack of integration in the research (Berry et al., 2018; Leekam et al., 2011). Nevertheless,
advances in the understanding of developmental trajectories of restricted and repetitive
behaviours have been made, primarily through studies of young children and adolescents
(Berry et al., 2018). As these studies are mostly concentrated on children of school age, it is
worth exploring this literature to look for information that may help to understand restricted
and repetitive behaviours and the effects these behaviours have on daily life for school age
children with autism.

Research into trajectories commonly addresses the relationships between restricted
and repetitive behaviours and age, cognitive ability and time. The findings regarding the
connection between age and higher order restricted and repetitive behaviours have generally
been in agreement. It has been reported that insistence on sameness behaviours and
circumscribed interests become more prevalent among older children (South, Ozonoff, &
McMahon, 2005), perhaps due to the increase in cognitive ability necessary to engage in
these behaviours (Richler et al., 2010).

Repetitive motor behaviours, considered to be lower order behaviours appear to be
more common in younger children (Berry, Russell, & Frost, 2018; Harrop et al., 2014;
Honey, McConachie, Randle, Shearer, & Couteur, 2008; Richler, Huerta, Bishop, & Lord,
2010). These behaviours become less frequent over time but do not disappear (Harrop et al.,
2014). However, Richler et al. (2010) found that repetitive sensory motor behaviours
remained high over a period of 9 years in a group of children who were aged 2 at the start of
the study, and then reassessed at ages 3, 5, and 9 years old. Similarly, a meta-analysis of
change in autism symptoms found that in general, restricted and repetitive behaviours did not
change over time across studies (Bieleninik et al., 2017). This indicates that caution must be
used in comparing findings across studies, as many variables such as measures used, age and
IQ may also be factors that influence outcomes.
The research on the relationship between cognitive ability and restricted and repetitive behaviours differs. One study found that there is no relationship between nonverbal intelligence quotient (NVIQ) and restricted and repetitive behaviours in children under three years of age (Bishop, Lord, & Richler, 2006). In addition, Kim and Lord (2010) found no relationship between NVIQ and restricted and repetitive behaviours in toddlers under two years old.

Conversely, other studies (e.g. Gabriels, Cuccaro, Hill, Ivers, & Goldson, 2005; Lam, Bodfish, & Piven, 2008; Militerni, Bravaccio, Falco, Fico, & Palermo, 2002; Rao & Landa, 2014) found that lower order restricted and repetitive behaviours are more persistent and severe in children with lower verbal and non-verbal IQ. The study by Militerni et al. (2002) consisted of participants aged 2-4 and 8-11 years old. It was found that simple repetitive sensory motor behaviours were more frequent in children with an IQ of less than 35. The participants in the study by Rao and Landa (2014) were aged between 4 and 8 years old. This study reported that children with lower cognitive ability displayed more stereotypic and restricted behaviours than children with a higher cognitive ability. Another study (Gabriels et al., 2005) found that children (mean age 10 years 7 months) with a low NVIQ showed significantly greater restricted, repetitive, and stereotyped behaviours than those with a high NVIQ. Additionally, a study by Harrop et al. (2014) found greater rates of restricted and repetitive behaviours in children with lower language abilities.

This indicates that school age children display a range of restricted and repetitive behaviours and some of these studies suggest that these behaviours can create barriers to social engagement and learning (Berry et al., 2018) and can hamper development (Honey, McConachie, Randle, Shearer, & Couteur, 2008). It is also suggested that different types of restricted and repetitive behaviours may have differing underlying causes and maintaining factors (Honey et al., 2008). Nonetheless, these studies did not focus on restricted and
repetitive behaviours in a school context and add nothing significant to the knowledge about the way these behaviours affect school participation.

2.5 Cause

2.5.1 Theoretical explanations of restricted and repetitive behaviours. The reviewed literature about the cause of restricted and repetitive behaviours falls into several categories. There is a substantial amount of research on the theoretical causes of restricted and repetitive behaviours. Neurobiological research (e.g. Rothwell et al., 2014; Wolff et al., 2017) focuses on explanations of restricted and repetitive behaviours based on gene-environment neuroadaptation and has received support from research based on animal models (Ray-Subramanian & Weismer, 2012). Support for genetic involvement is also indicated through familial aggregation in factor analytic studies of restricted and repetitive behaviours (Szatmari et al., 2006).

Neuropsychological perspectives have highlighted the role of executive functioning in restricted and repetitive behaviours. Results for the findings of executive dysfunction are mixed possibly due to the types of assessment (Leekam et al., 2011). From a developmental perspective, it is unlikely that executive functioning could have a direct causal link to restricted and repetitive behaviours as they appear so early in typical development. Lack of specificity is a problem as executive functioning impairments are common across a range of childhood disorders including obsessive compulsive disorder (OCD) and attention deficit and hyperactivity disorder (ADHD) (Clark, Prior, & Kinsella, 2002).

The developmental psychological approach to restricted and repetitive behaviours is best represented by work by Thelen (1981). This approach frames restricted and repetitive behaviours as having adaptive functions that are maintained past typical infant development in children with autism. It could be that rhythmical behaviour patterns of repetition have a systemic effect on development that transcends the behaviours themselves and may be related
to other areas of development such as communication and social interaction (Iverson & Wozniak, 2007).

Although these approaches to the cause of restricted and repetitive behaviours are important fields of research they are all theoretical or clinical explanations. This literature is not focused on the effects of restricted and repetitive behaviours in any context. However, there are two further areas of research regarding the cause of restricted and repetitive behaviours which are relevant to the current study. These areas are the link between restricted and repetitive behaviours and anxiety, and the relationship between restricted and repetitive behaviours and context.

2.5.2 Restricted and repetitive behaviours and anxiety. The number of studies of anxiety, sensory responses and restricted and repetitive behaviours in people with autism has been growing in recent years. The relationship between these three constructs is complicated, but it is clear there are links between anxiety and particular types of restricted and repetitive behaviours.

Individuals with autism often present with co-occurring anxiety which is reported to be a significant source of distress (White, Oswald, Ollendick, & Scaghill, 2009; Wood & Gadow, 2010). Anxiety has long term associations with depression, hyperactivity and self-injurious behaviour (Mazzone et al., 2013). To date, there has been little agreement about the prevalence rate of anxiety in individuals with autism, with proposed rates ranging from 11 to 87 per cent (White & Roberson-Nay, 2009). However, there is general consensus that 40 to 50 per cent of people with autism meet criteria for at least one anxiety disorder (MacNeil, Lopes, & Minnes, 2009; Steensel, Bögels, & Perrin, 2011; White et al., 2009), whereas estimates in typically developing children are thought to be between three and 24 per cent (Cartwright-Hatton, McNicol, & Doubleday, 2006). Anxiety in individuals with autism has been linked to sensory over responsiveness (e.g. Green & Ben-Sasson, 2010) and restricted
and repetitive behaviours and interests (Factor et al., 2016; Gotham et al., 2013; Joosten & Bundy, 2010; Joosten et al., 2009; Lidstone et al., 2014; Rodgers et al., 2012; Spiker et al., 2012; Wigham et al., 2015) but there are differing views on the exact nature of the relationships between these three constructs.

Some investigators have examined the link between restricted and repetitive behaviours and interests and anxiety, and found that higher levels of anxiety are accompanied by a greater incidence of restricted and repetitive behaviours and interests (e.g. Rodgers et al., 2012). However, it is still not fully understood why this relationship occurs. A number of studies (e.g. Joosten & Bundy, 2010; Joosten et al., 2009; Lidstone et al., 2014; Rodgers et al., 2012) investigated this connection and found evidence to suggest there is a correlation between anxiety and insistence on sameness behaviours, but not between anxiety and repetitive motor behaviours. It has also been suggested that the relationship between sensory processing abilities, restricted and repetitive behaviours and anxiety may be due to intolerance of uncertainty (Wigham, Rodgers, South, McConachie, & Freeston, 2015).

Restricted and repetitive behaviours and interests may also function as a way to reduce anxiety (Factor et al., 2016). However, social motivation may also be a mediator between restricted and repetitive behaviours and interests and anxiety. It is thought that individuals with autism do not derive satisfaction from social interactions often (Kohls et al., 2013), and therefore do not seek these experiences. This social disconnection causes individuals to seek non-social behaviours for intrinsic pleasure resulting in the engagement of restricted and repetitive behaviours and interests. This theory is further supported with a study by Loftin, Odom, and Lantz (2008) that has shown that social skills training leads to higher incidents of social interaction and lower rates of restricted and repetitive behaviours and interests.
When viewing restricted and repetitive behaviours and interests contextually, it is clear that there is a strong link with anxiety and it is important to be aware of the complexity of this relationship. All of the studies mentioned above however, do not directly address the topic of the effects of restricted and repetitive behaviours on participation. Moreover, whilst a holistic view provides a better understanding of restricted and repetitive behaviours and interests and the way these behaviours affect other areas of an individual’s life, it does not explain what effects restricted and repetitive behaviours and interests have on school participation.

2.6 Context

There is a number of published studies that suggest that context may be a cause of some types of restricted and repetitive behaviours. For the purpose of this study, the literature merits further investigation as some of the studies are school context based. This research may provide some insight into the effects of restricted and repetitive behaviours on participation.

Additionally, understanding the context in which restricted and repetitive behaviours occur can inform decisions regarding intervention. If the belief is that context does indeed affect these behaviours, then intervention needs to change from simply suppressing behaviours to adjusting the environment (Matson & Nebel-Schwalm, 2007). Understanding the effect of context can also help determine whether the restricted and repetitive behaviours are of concern. For example, a repetitive motor behaviour such as hand flapping or rocking may not be considered a problem at home whilst watching a television show but may be more problematic in class (Joosten, Bundy, & Einfeld, 2012).

Assessment of the motivation for restricted and repetitive behaviours in the past has led to interventions that alter the environment, social demands and schedules, and improve communication, rather than treating the behaviours (Horner, Carr, Strain, Todd, & Reed,
Researchers Joosten, Bundy and Enfield determined that further investigation of the variables that drive restricted and repetitive behaviours was required so that modifiable aspects of the behaviour could be understood. Three studies were conducted by these researchers between 2008 and 2012 examining the effect of context on motivating students to engage in restricted and repetitive behaviours. The participants for all three studies were a group of students attending a specialist day school.

Joosten and Bundy (2008) initially investigated motivation for restricted and repetitive behaviours in a group of 67 children aged 5-18 years with a diagnosis of either intellectual disability or autism and intellectual disability. The Motivation Assessment Scale (MAS; Durand & Crimmins, 1988) was used as a measurement tool, which grouped 16 items into four sources of motivation; to gain social attention, both negative and positive; to gain access to tangible objects or in response to object being removed; to escape from people or activities and to experience sensory feedback. The results of the study found that diagnosis was a factor in explaining the motivation for restricted and repetitive behaviours. Children with intellectual disability were more likely to be motivated by the desire to gain an object, whilst children with both intellectual disability and autism were more likely to be motivated by sensory stimulation or escape when engaging in restricted and repetitive behaviors.

Further to this study, Joosten, Bundy, and Einfeld (2009) studied the motivation for stereotypic and repetitive behaviours in the same group of participants from the 2008 study, using a revised MAS. For the study the MAS was divided into intrinsic and extrinsic measures and anxiety was added in as an intrinsic motivator. The study found that stereotypic and repetitive behaviours are impelled by multiple motivators and can be both intrinsically and extrinsically driven.

Building on the two prior studies, the later study by Joosten et al. (2012) broadened their research on the influences of context on stereotypic and repetitive behaviour in the same
The research found that the effect of context on restricted and repetitive behaviours and interests is a complex combination of intrinsic factors, such as level of anxiety, and environmental factors such as what is happening, or who is involved. The study also revealed that restricted and repetitive behaviours occur more frequently during transition time, possibly because the individual is uncertain of what is about to happen next, and during free time when trying to gain attention or a tangible object. It is also thought that these behaviours may also be present during free time due to reduced stimulation and are used as a sensory enhancing tool. In agreement with other studies, Joosten et al. (2012) also refer to the relationship between anxiety, sensory responsiveness and restricted and repetitive behaviours as further complications in determining the cause of restricted and repetitive behaviours.

Nonetheless, whilst restricted and repetitive behaviours were measured, these studies were observational, and each child was only rated by one rater. Due to the requirement of the rater to have close contact with the child, bias was possible. The construct of participation was not discussed in these studies, as the intention was not to find out if restricted and repetitive behaviours affected participation, but to find out if context motivated the behaviours. Further research is required to understand the potential impacts of restricted and repetitive behaviours in a school setting, with a clear focus on participation.
2.7 Autism and school participation

Inclusive education is a movement of substantial proportions (Evans & Lunt, 2002; Rodriguez & Garro-Gil, 2015). The Salamanca Statement indicates that schools must respond to the needs of the diverse learner by adjusting curricula and teaching strategies to accommodate all students, including those with physical and learning disabilities (Hunt, 2011; Unesco, 1994). It is reported that more than half of students with autism spend a significant part of their day in mainstream schooling, with a large group spending at least 80% of their day in class (Adams, Taylor, Duncan, & Bishop, 2016). While inclusive education can lead to increased social engagement and advanced education goals for students with disabilities compared to those who are educated in special schools, inclusion is still challenging for mainstream schools and teachers (Eldar, Talmor, & Wolf-Zukerman, 2010; Vakil et al., 2009).

Educational outcomes for students with autism in mainstream schooling are poor compared to other disability groups and to typically developing students. Outcomes are also poor in relation to the cognitive ability of students with autism, that is, they underachieve in relation to their cognitive ability (Keen, Webster, & Ridley, 2016). There is an increasing need for special education resources for children with autism (Kim, Bal, & Lord, 2018) with many educators finding it difficult to successfully include students with autism in their classrooms (Lindsay, Proulx, Thomson, & Scott, 2013). This is most likely because inclusion of children with disabilities, and in particular, children with autism (Roberts & Simpson, 2016) remains one of the least understood areas of education (Symes & Humphrey, 2010).

The search for studies about participation of children with autism in schools uncovered a considerable amount of literature addressing the subject of inclusion in mainstream schooling. A review of the literature into attitudes of key stakeholders for students with autism was conducted by Roberts and Simpson (2016), which highlighted the
diverse attitudes to inclusion among stakeholders. One of the concerns that teachers had was the behaviours of students with autism in the classroom (Johansson, 2014). Behaviours such as stereotypic utterances, movement around the classroom and task refusal were considered disruptive and inappropriate (Hay & Winn, 2005; Sansosti & Sansosti, 2012; Soto-Chodiman, Pooley, Cohen, & Taylor, 2012), and teachers raised concerns about the effects of these behaviours on other students in the classroom (Sansosti & Sansosti, 2012).

However, it was found that most of the behaviours described by teachers in these studies were the result of the interaction between the student and the environment rather than being a primary characteristic of autism (Roberts & Simpson, 2016). This highlights a gap in understanding how the school context can affect the behaviour of children with autism, including restricted interests and repetitive behaviours, which could prevent learners with autism from successfully participating and learning in the classroom (Ravet, 2011).

Participation as a construct has gained much scrutiny in recent times being considered a positive influence on an individual’s health and wellbeing that also plays a role in learning new skills and developing relationships (Anaby et al., 2014; Khetani et al., 2014). A clear definition of participation is required when researching the effects of restricted and repetitive behaviours in the school context. There have been varied descriptions of participation (Granlund et al., 2012) leading to multiple approaches to measurement, resulting in misinterpretation of findings and an inability to compare studies (Imms et al., 2016). Whilst participation is a multidimensional construct it can be defined as attendance and involvement. The Participation and Environment Measure for Children and Youth (PEM-CY; (Coster et al., 2012), which is being more widely used in the measurement of participation uses this definition of participation.

Using the PEM-CY as a measurement tool, Coster et al. (2013) compared the participation patterns of children between 5 and 17 years old, with and without disabilities by
looking at school features as a barrier or support for participation. The study found that overall school participation was higher for students without disabilities across the three domains of frequency, involvement and satisfaction. Parents of children with disabilities stated that their children participated less in important school related activities. They reported that features of the environment such as physical, cognitive and social demands of activities and the sensory qualities of the environment were barriers to the participation of their children. This study adds to the understanding of the difficulties children with disabilities face in the mainstream schooling context. However, only a small percentage of the children included in this study were listed as having autism as their sole disability. Additionally, the sole focus of the study was features of the physical and social environment that create barriers to learning, not child characteristics.

Another recent study used the PEM-CY to explore the participation of children with autism at home, in the community and at school (Simpson et al., 2017). In the school section of the PEM-CY, it was noted that even when participating in school activities, children with autism scored lower on involvement than their typically developing peers. This included children as young as five years old and suggests that patterns of difference may be established from the very start of school. Again, this information builds evidence that children with autism are not participating at school as fully as others. Nonetheless, as the focus for this study was measuring levels of participation, the reasons for lower levels of participation involvement levels for these students are not considered.

There are further studies that investigate classroom engagement for children with autism (e.g. Nicholson, Kehle, Bray, & Heest, 2011; Ruble & Robson, 2007; Sparapani, Morgan, Reinhardt, Schatschneider, & Wetherby, 2016). As with the previous research mentioned, the focus is not about how restricted and repetitive behaviours contribute to or
create barriers to classroom participation. This further highlights the gap in the literature regarding the effects of child characteristics on participation.

Only one study was found at this time that specifically discussed how restricted and repetitive behaviours affected the participation of an individual student with autism in a school setting. A study by Sigafoos, Green, Payne, O'Reilly, and Lancioni (2009) looked into an intervention strategy to prevent a student from missing out on learning time due to a fixation on having items on his school desk arranged in a particular way. Whilst it was acknowledged that this particular behaviour was affecting participation during classroom teaching time, the study did not explore any other areas of school participation to determine if this particular behaviour affected other activities. The purpose of the study was to measure the effects of an intervention, so participation was not defined or measured. Data collection for this research was observational and was subject to human bias (Kawulich, 2005). Lastly, this study used only one participant, limiting the replication of the findings to the population of individuals with autism.

The literature covered in this section considers inclusion challenges and teacher perspectives. There is consensus that children with disabilities, and children with autism participate less in school compared to their typically developing peers. Whilst these studies have enormous benefit in understanding how students with autism can achieve success in the classroom, they tended to be school, teacher or environment centered and have not considered the child characteristics and how these affect inclusion and participation.

In studies of participation (Coster et al., 2013; Simpson et al., 2017) the term was clearly defined. However, there has been little research on the impact of restricted and repetitive behaviours on participation. No study was found which used standardised measures to determine the effect of restricted and repetitive behaviours on school or classroom participation in children with autism. The aim of this research proposal therefore, is to
address the identified research gaps and establish whether restricted and repetitive behaviours have an effect on participation in school for children with autism. Participation will be clearly defined as attendance and involvement and will be measured. Restricted and repetitive behaviours will also be measured. The data collected will be analysed to determine if these behaviours affect participation. This study will advance our understanding of restricted and repetitive behaviours in the school context and enhance effective education for children with autism in mainstream schooling.

2.8 Conceptual framework

Whilst restricted and repetitive behaviours and interests are well defined, there has been confusion about the definition of participation in studies, which has led to varied descriptions of the concept (Granlund et al., 2012) and therefore mixed approaches to measurement. This has caused misinterpretation of results found and reported (Imms et al., 2016). Researching children with autism who engage in restricted and repetitive behaviours in terms of participation in the school context requires an understanding of the constructs of both restricted and repetitive behaviours and participation.

Imms et al. (2016) reviewed the language, definitions and intervention research around the construct of participation with the aim of understanding how participation is viewed by other researchers. It has been found that participation is a multidimensional construct that includes individual and environmental factors as an influence on participation. Attendance and involvement were found to be the two themes that were explicitly linked with the experience of participation, with attendance a prerequisite for involvement (Imms et al., 2016). Participation is a multidimensional construct (Granlund et al., 2012; Imms et al., 2017) that also includes related concepts of preference, activity competence and sense participation. Additionally, all participation occurs within a contextualised setting (Anaby et al., 2014; Hammel et al., 2008; Mallinson & Hammel, 2010) (see Figure 2).
The Family of Participation-related constructs (fPRC; Imms et al., 2016) is a conceptual framework that considers participation as an entry point and a primary outcome of intervention. It also identifies the transactional processes by which participation is expressed. This framework was designed to provide conceptual and terminological consistency and to support education research and practice for children and adults living with long term impairments. Research designed using this framework aims to understand the influences that affect an individual’s daily functioning by addressing their developmental, mental, physical, psychosocial and environmental challenges. This framework supports research of both
immediate and long-term outcomes on lives impacted by impairment by examining the interacting forces on the individual child and the family within the contexts in which they live.

**Figure 3. Bidirectional restricted and repetitive behaviours and participation construct**


The fPRC provides a conceptual framework for this study, from which to examine the interaction between the factors of restricted and repetitive behaviours and participation within the context of school. The framework specifies clear and consistent terminology for participation, which will enable comparison of this study with others that employ the same
RESTRICTED AND REPETITIVE BEHAVIOURS AND PARTICIPATION AT SCHOOL

definition. The research resulting from the framework is designed to increase understanding
of child characteristics that affect the daily functioning of an individual, in this case,
restricted and repetitive behaviours, and their effect on participation. The study also
acknowledges that the relationship between the two factors is bidirectional (as illustrated in
figure 3). This relationship is supported by the bioecological model of development
(Bronfenbrenner & Ceci, 1994), which states that biological and environmental factors
interact to influence a child’s development (Cunningham & Rosenbaum, 2015). Within the
microsystem it is explained that proximal processes, disposition, personal resources and
demand characteristics, context and time all interact with each other reciprocally to influence
development (Bronfenbrenner & Ceci, 1994). The intended outcome of this study is to
examine the effect of restricted and repetitive behaviours and interests on participation for
children with autism at school. The implications of these findings could be to inform
interventions and modifications to address these barriers to learning. It is not intended that
child focused interventions only will be suggested, nor that only environmental adjustments
be made, but a combination of both approaches should be considered.

3. Method

Data were collected using online surveys. Online surveys are an efficient, cost
effective and convenient way to gather information (Lefever, Dal, & Matthiasdottir, 2007;
Scott et al., 2011). Surveys collect information at a point in time from a pre-determined
population specific to the research study. Data collected from standardised surveys can be
used to explore the effects of one set of variables on another which suits the purpose of this
study and allows the data to be compared to other studies using the same measures (Creswell
& Plano Clark, 2018).

Online data collection has the benefit of reaching larger populations. This potentially
enables a wider spread of respondents (Evans & Mathur, 2005) allowing for inclusion of diversity. Additionally, the ability to collect data from many people means that the data is more likely to be based on a representative sample and can then be generalisable to a population (Kelley, Clark, Brown, & Sitzia, 2003).

Furthermore, response rates can vary so being able to reach a larger population ensures a better opportunity to get a sufficient number of responses. Additionally, participants have the flexibility of completing online surveys at their own convenience, with respondents having the option of saving the survey and returning to complete the survey at a convenient time (Jones, Murphy, Edwards, & James, 2008).

3.1 Participants

The participants were accessed through the Cooperative Research Centre for Living with Autism’s (Autism CRC) Longitudinal study for Australian Students with Autism (LASA) research project. The Autism CRCs LASA project was designed to investigate educational and participation trajectories and outcomes for Australian students with autism over a six-year period. Participants were recruited across Australia, where there are an estimated 35 000 or more school aged children with autism. The primary participants sought were caregivers of children aged four to five, and nine to 10 years old who have received a clinical diagnosis of autism from a health care provider. Parent/caregiver participants were recruited from state autism organisations, child development and early intervention units, parent support and autism advocacy groups, websites, mailing lists and internet groups. The parent/caregiver participants were initially asked to register through an internet link, after which a research team member contacted them to ascertain eligibility and interest in participating. Once this was completed the parent/caregiver was sent an online questionnaire (Roberts et al., 2018).
Ethical approval for the Autism CRCs LASA study was obtained from all recruiting sites and universities involved in the project. Consent was obtained from all parents whose child joined the study. There was no risk to the participants associated with the study. However, there was some possibility that parents may become distressed when discussing their child’s autism traits and difficulties. Therefore, the study was designed to finish with questions about the strengths and interests to end on a positive note. The parents were all provided with the project administrator’s contact details so that they could discuss the questionnaire if needed. Participant information was securely stored electronically. Once downloaded from the database it was anonymised by allocating an identification number for each participant. De-identified data was made available only to members of the research team. Ethics approval for this particular study was gained from Griffith University. Approval was also given by the LASA team and the Autism CRC. The data released was de-identified and was used in an ethical manner in accordance to the guidelines of the LASA study.

3.2 Sample participants

The participants for this study were parents/ caregivers of a group of children aged nine-10 years old who have a diagnosis of autism. This age group were in upper primary school at the data collection point in time. This group of students was chosen as they were in their last 1 or 2 years of primary schooling. Therefore, their participation and behaviour scores should be representative of their experience through primary school.

Demographic information for this sample is provided in Table 2. There were 131 participants in this cohort in Time 1 who provided data for both of the questionnaires used for data analysis. The ratio of male to female in this cohort is 4:1 which compares to previous statistics (Fombonne, Quirke, & Hagen, 2011) but is slightly higher than the current statistic of 3.5:1 according to a study by Loomes, Hull, and Mandy (2017). In addition to autism,
nearly 44% of participants have another medical condition or disability e.g. attention deficit and hyperactivity disorder (ADHD), anxiety, asthma and epilepsy.

For this study the mother was predominantly the person who filled out the questionnaires. The most common occupation for caregivers was part time employment and 74.3% of caregivers stated that they completed tertiary education. The average family income was $80 001 - $180 000. Caregivers also completed the Social Communication Questionnaire (SCQ; Rutter, Bailey, & Lord, 2003) to identify the level of autism severity. The SCQ provides a cut-off score of 15 with scores above this indicating more severity ($M = 22.09, SD = 6.61$).
Table 2.

**Child and Caregiver Characteristics**

<table>
<thead>
<tr>
<th>Categorical variables</th>
<th>Participants (n = 131)</th>
<th>Categorical variables</th>
<th>Participants (n= 131)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>Caregiver’s highest level of education</td>
<td>N (%)</td>
</tr>
<tr>
<td>Child gender</td>
<td></td>
<td>No formal/ primary school</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>111 (79.3)</td>
<td></td>
<td>2 (1.4)</td>
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<tr>
<td>Female</td>
<td>29 (20.7)</td>
<td>Secondary school</td>
<td>32 (22.9)</td>
</tr>
<tr>
<td>Other medical condition or disability</td>
<td>61 (43.6)</td>
<td>Tertiary education</td>
<td>104 (74.3)</td>
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<tr>
<td>Caregiver’s relationship to the child</td>
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<td>Missing</td>
<td>2 (1.4)</td>
</tr>
<tr>
<td>Mother</td>
<td>122 (87.8)</td>
<td>Annual family income</td>
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</tr>
<tr>
<td>Father</td>
<td>14 (10.1)</td>
<td>$18 200</td>
<td>5 (3.6)</td>
</tr>
<tr>
<td>Other</td>
<td>3 (0.21)</td>
<td>$18 201 - $37 000</td>
<td>15 (10.7)</td>
</tr>
<tr>
<td>Caregiver’s occupation</td>
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<td>$37 001 - $80 000</td>
<td>26 (18.6)</td>
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<td>4 (2.9)</td>
<td>$80 001 - $180 000</td>
<td>65 (46.4)</td>
</tr>
<tr>
<td>Full time employment</td>
<td>34 (24.3)</td>
<td>&gt; $180 000</td>
<td>13 (9.3)</td>
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<td>Part time employment</td>
<td>57 (40.7)</td>
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<tr>
<td>Caring responsibilities</td>
<td>36 (25.7)</td>
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<tr>
<td>Full time study</td>
<td>3 (2.1)</td>
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<tr>
<td>Part time study</td>
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</tr>
</tbody>
</table>
3.3 Measures

Table 3.

Measurement Instruments

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental Behaviour Checklist-Parent Version (DBC-P; Einfeld &amp; Tonge, 1995).</td>
<td>The DBC-P is a parent/caregiver 96 item checklist that assesses the behavioural and emotional disturbances in young people between four and 18 years with developmental or intellectual disabilities.</td>
</tr>
<tr>
<td>Participation and Environment Measure- Children and Youth (PEM-CY; Coster et al., 2011).</td>
<td>The PEM-CY is a parent-report instrument that reports on the number of activities, frequency of attendance, the level of involvement, and parent’s desire for change in participation in typical activities at home, in school and in the community.</td>
</tr>
<tr>
<td>Repetitive Behaviour Questionnaire- 2 (RBQ-2; Leekam et al., 2007).</td>
<td>The RBQ-2 has 20 questions based on the two-factor grouping of high and low order behaviours further divided into four factors: repetitive motor movements, rigidity/adherence to routine, preoccupation with restricted patterns of interest and unusual sensory interests.</td>
</tr>
<tr>
<td>Vineland Adaptive Behaviour Scales Second Edition (VABS-II; Sparrow, Cicchetti, &amp; Balla, 2005).</td>
<td>The VABS-II is a clinician-administered, semi-structured parent interview that is used to obtain parent ratings of children’s adaptive functioning across three domains: communication, socialisation, and daily living skills.</td>
</tr>
</tbody>
</table>
Table 3 summarises the measurement tools used in this study. The DBC-P was used to measure the amount of restricted and repetitive behaviours that each participant displayed. The PEM-CY was used to measure frequency of participation, and involvement of each child in school activities. The RBQ-2 was used for comparison to validate the use of the BDC-P as a restricted and repetitive behaviour measurement. The VABS-II was used in this study as an indicator of adaptive functioning of participants. This was included as a measure to control developmental differences. These measures are described in further detail below.

3.3.1 Developmental Behaviour Checklist-Parent Version (DBC-P; Einfeld & Tonge, 1995). The DBC-P was used in the Autism CRCs LASA longitudinal study. The DBC-P is a parent/caregiver 96 item checklist that assesses the behavioural and emotional disturbances in young people between four and 18 years with developmental or intellectual disabilities (Brereton, Tonge, Mackinnon, & Einfeld, 2002). It is completed by the primary caregiver. The DBC-P was developed in response to the limitations of available instruments to evaluate the psychopathology of children, adolescents and adults with developmental disabilities (Aman & Singh, 1988; Fraser & Rao, 1991). To address these limitations, Einfeld & Tonge (1995) developed a standardised instrument to broadly assess the emotions and behaviours of individuals from four to 18 years old with intellectual disability. The DBC-P was revised in 2002, and currently provides a total behaviour score (range 0 - 192; Cronbach’s coefficient = 0.94), which can reflect a level of disturbance which would be considered clinically significant by a trained physician. It provides six subscale scores: disruptive, antisocial, self-absorbed, communication disturbance, anxiety and social relating (Brereton et al., 2002) and also individual behaviour symptom scores.

At the same time, the Developmental Behaviour Checklist- Autism Screening Algorithm (DBC-ASA) was created (Brereton et al., 2002) which was modified in 2016, applying DSM-5 autism criteria. Further to this, the Developmental Behavioural Checklist-
Adult Version (DBC-A; Mohr, Tonge, & Einfeld, 2005) was created in order to allow continuous assessment of psychopathology over a lifespan for individuals with ID. The DCB-P has strong psychometric properties and is reliable and valid in discriminating between individuals with ID with and without autism using a factor analysis derived 29-item score, the DBC-Autism Screening Algorithm (DBC-ASA; score range 0–58; cut-off score 14) (Brereton et al., 2002; Steinhausen & Winkler Metzke, 2004; Teh, Chan, Tan, & Magiati, 2017).

The DBC-P has been used in a variety of research areas such as anxiety, and continuity and change in anxiety in young people with autism (Gotham, Brunwasser, & Lord, 2015; Teh et al., 2017) and to compare psychopathology in children and adolescents with autism and young people with ID (Brereton, Tonge, & Einfeld, 2006). The DBC-P was also used in a study by Chandler et al., (2016) to assess the frequency and pervasiveness of emotional and behavioural problems in young children with autism. It was picked out of a selection of tools by parents who considered it easy to fill in and highly relevant to their child and is considered to be an effective tool to measure emotional and behavioural difficulties in children with autism (Brereton et al., 2006).

Items in the DBC-P survey relate to restricted and repetitive behaviours. An investigation was conducted to determine if it was comprehensive enough for this study. To validate the use of the DBC-P in measuring restricted and repetitive behaviours, DBC-P items were compared with the Repetitive Behaviour Questionnaire-2 (RBQ-2; Leekam et al., 2007) items. The RBQ-2 has 20 questions based on the two-factor grouping of high and low order behaviours further divided into four factors: repetitive motor movements, rigidity/adherence to routine, preoccupation with restricted patterns of interest and unusual sensory interests. In this study, the sensory interests section was not included as these behaviours are not being researched.
In the repetitive motor movement category there are five items from the RBQ-2 that match questions from the DBC-P (Table 4). Items 25 in the DBC-P and 72 corresponded with item 2 in the RBQ-2. Item 90 in the DBC-P related to items 3, 4 and 5 of the RBQ-2. Additionally, item 59 in the DCB-P correlated to item 6 in the RBQ-2.

Table 4.

Repetitive Motor Movements in the RBQ-2 and the DBC-P

<table>
<thead>
<tr>
<th>RBQ-2</th>
<th>DBC-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Repetitively fiddle with toys or other</td>
<td>25. Flicks, taps, twirls objects repeatedly</td>
</tr>
<tr>
<td>items? (e.g. spin, twiddle, bang, tap,</td>
<td>72. Switches lights on and off, pours water over</td>
</tr>
<tr>
<td>twist, or flick anything repeatedly?)</td>
<td>and over; or similar repetitive activity</td>
</tr>
<tr>
<td>3. Spin himself around and around?</td>
<td>90. Unusual body movements, posture, or way of walking</td>
</tr>
<tr>
<td>4. Rock backwards and forwards, or side</td>
<td></td>
</tr>
<tr>
<td>to side, either when sitting or when</td>
<td></td>
</tr>
<tr>
<td>standing?</td>
<td></td>
</tr>
<tr>
<td>5. Pace or move around repetitively?</td>
<td></td>
</tr>
<tr>
<td>(e.g. walk to and from across a room or</td>
<td></td>
</tr>
<tr>
<td>around the same path in the garden?)</td>
<td></td>
</tr>
<tr>
<td>6. Make repetitive hand and/or finger</td>
<td>59. Repeated movements of hands, body, head</td>
</tr>
<tr>
<td>movements? (e.g. flap, wave, or flick,</td>
<td>or face e.g. hand flapping or rocking</td>
</tr>
<tr>
<td>his/her hands or fingers repetitively?)</td>
<td></td>
</tr>
</tbody>
</table>

A comparison between the measures identifies items in the rigidity/ adherence to routine category in the RBQ-2 that match with items in the DBC-P (Table 5). Item 91 in the
DCB-P corresponded to items 13, 15 and 16 in the RBQ-2 regarding insistence on things at home, and aspects of daily routines staying the same. Item 11 in the DBC-P corresponded with item 14 in the RBQ-2. Additionally, there is a parallel with DCB-P item 26 and RBQ-2 question 19.

Table 5.

*Rigidity and/ or Adherence to Routine in the RBQ-2 and the DBC-P*

<table>
<thead>
<tr>
<th>RBQ-2</th>
<th>DBC-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Insist on things at home remaining the same? (e.g. furniture staying in the same place, things being kept in certain places, or arranged in certain ways?)</td>
<td>91. Upset and distressed over small changes in routine or environment</td>
</tr>
<tr>
<td>15. Insist that aspects of daily routine must remain the same?</td>
<td></td>
</tr>
<tr>
<td>16. Insist on doing things in a certain way or redoing things until they are “just right”?</td>
<td></td>
</tr>
<tr>
<td>14. Get upset about minor changes to objects (e.g. flecks of dirt on his clothes, minor scratches on toys)</td>
<td>11. Cries easily for no reason, or over small upsets</td>
</tr>
<tr>
<td>19. Insist on eating the same foods, or a very small range of foods, at every meal?</td>
<td>26. Fussy eater or has food fads</td>
</tr>
</tbody>
</table>
The items addressing preoccupation with restricted patterns of interest from the RBQ-2 and the matching items in the DBC-P shown in Table 6. Item 5 from the DBC-P matched with item 1 in the RBQ-2. Items 28, 44 and 54 in the DBC-P corresponded with item 7 on the RBQ-2. Item 68 in the DBC-P matched with item 8 from the RBQ-2, as did item 44 in the DBC-P and item 11 in the RBQ-2. Finally, item 58 from the DBC-P correlated with item 17 in the RBQ-2.
Table 6.

*Preoccupation with Restricted Patterns of Interests in the RBQ-2 and the DBC-P*

<table>
<thead>
<tr>
<th>RBQ-2</th>
<th>DBC-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Arrange toys or other items in rows or patterns?</td>
<td>5. Arranges objects or routine in strict order</td>
</tr>
<tr>
<td>7. Have a fascination with specific objects? (e.g. trains, road signs or other things?)</td>
<td>28. Gets obsessed with an idea or activity</td>
</tr>
<tr>
<td>8. Like to look at objects from particular or unusual angles?</td>
<td>44. Likes to hold or play with an unusual object e.g. string, twigs; overly fascinated by something e.g. water</td>
</tr>
<tr>
<td>11. Have any special objects he/she likes to carry around? (e.g. a teddy, a blanket, a book, or a stick?)</td>
<td>54. Overly interested in looking at, listening to or dismantling mechanical things e.g. lawnmower or vacuum cleaner</td>
</tr>
<tr>
<td>17. Play the same music, game or video, or read the same book repeatedly?</td>
<td>58. Preoccupied with only one or two particular interests</td>
</tr>
<tr>
<td>28. Gets obsessed with an idea or activity</td>
<td></td>
</tr>
<tr>
<td>44. Likes to hold or play with an unusual object e.g. string, twigs; overly fascinated by something e.g. water</td>
<td></td>
</tr>
<tr>
<td>54. Overly interested in looking at, listening to or dismantling mechanical things e.g. lawnmower or vacuum cleaner</td>
<td></td>
</tr>
</tbody>
</table>

Sensory interest items are not included in the restricted and repetitive behaviours that this study is investigating. Once these were removed from the RBQ-2, 17 items were left. There was no equivalent question in the DCB-P to question 20: *What sort of activity will your child choose if they are left to occupy themselves?* so this was also disregarded.
Therefore, 14 DBC-P items correlated with 15 of the remaining 16 RBQ-2 items. The DBC-P items matched 100% of the repetitive motor movement items, 100% of the rigidity/adherence to routine items (disregarding the sensory item in this section) and 83% of the preoccupation with restricted patterns of interest items (also disregarding the sensory item in this section). The only RBQ-2 item that could not be matched was ‘collect or hoard any items of any sort?’ It was therefore decided that the data from the DBC-P was appropriate for the purpose of this study because of its extremely high correlation to the RBQ-2.

Additionally, parents of children with autism encounter more stress than other parents (Jones, Bremer, & Lloyd, 2017; Pozo, Sarriá, & Brioso, 2014; Zaidman-Zait et al., 2017). The desire to minimise the burden on the participating parents played a significant part in the decision not to administer another survey (Sullins, 2003).

3.3.2 Participation and Environment Measure- Children and Youth (PEM-CY; Coster et al., 2011). The PEM-CY is a parent-report instrument that reports on the number of activities, frequency of attendance, the level of involvement, and parent’s desire for change in participation in typical activities at home, in school and in the community. Perceived supports or barriers to participation in the environment are also examined (Coster et al., 2011). An 8-point Likert scale is used to score frequency of child participation from never (0) to daily (7), and how involved the individual is measured on a 5-point Likert scale ranging from minimally involved (1) to very involved (5). The parent/caregiver also identifies whether they would like to see a change in the participation levels in the activities (no or yes) (Coster et al., 2013). In addition, the parent is asked whether certain features of each environment are barriers or assist in participation (response options: not an issue, usually helps, sometimes helps/ sometimes makes harder, usually makes harder). As the focus of this study is the school environment, data were only used from the school participation component of this report, focusing on the attendance and involvement scales.
The school participation items include classroom activities, (e.g. group work, classroom discussions and tests), field trips, and school events (e.g. going to the museum, school fete or school disco). Activities such as school-sponsored teams, clubs and organisations (e.g. sports teams or student’s councils), getting together with peers outside of class, and other special roles at school (e.g. peer mentor or tuckshop duties) are also included.

The psychometric evaluation of the PEM-CY confirmed its validity as a measure of participation and environment for children and youth with and without disabilities (Coster et al., 2011). The International Classification of Functioning, Disability and Health (ICF) framework refers to the PEM-CY as an ICF-compatible assessment instrument for measuring participation. The PEM-CY has also been used in a variety of research areas including school participation for children with and without disabilities (Anaby et al., 2014; Coster et al., 2013) to assess participation within the home environment (Law et al., 2013), for health impact assessment (Khetani et al., 2014) to assess participation of children needing or using power mobility (Field, Miller, Ryan, Jarus, & Roxborough, 2015) and has been translated into Korean and validated (Jeong, Law, Stratford, DeMatteo, & Kim, 2016) among other studies. Recent research has used the PEM-CY to measure participation of children with autism at school, home and in the community (Egilson, Jakobsdóttir, & Ólafsdóttir, 2017; Egilson, Jakobsdottir, Olafsson, & Leosdottir, 2017; Simpson et al., 2017).

3.3.3 Vineland Adaptive Behaviour Scales Second Edition (Vineland-II). The Vineland Adaptive Behaviour Scales (VABS; Sparrow, Balla, & Cicchetti, 1984) and has been used frequently over the past three decades as an assessment for adaptive behaviour in individuals with autism as well as other populations (Gillham, Carter, Volkmar, & Sparrow, 2000; Perry, Flanagan, Dunn Geier, & Freeman, 2009). The VABS evaluates adaptive functioning in four domains: Communication, Daily Living Skills, Socialisation, and Motor
Skills. Age equivalent scores and standard scores ($M = 100; SD = 15$) are given for each of the four domains and can be combined to create an overall Adaptive Behaviour Composite score (ABC).

The second edition of the VABS was published in 2005 (Vineland-II; Sparrow, Cicchetti, & Balla, 2005) and measures adaptive functioning in a similar way to the original tool. The VABS-II is a clinician-administered, semi-structured parent interview that is used to obtain parent ratings of children’s adaptive functioning across three domains: communication, socialisation, and daily living skills. The VABS-II provides an indicator of the degree to which daily adaptive skills are impacted, over and above what would be expected given IQ level in children with developmental disabilities. The VABS-II standard scores have a mean of 100 and standard deviation of 15. The VABS-II provides the following categorical levels of adaptive functioning: high ($\geq 130$), moderately high (115–129), adequate (86–114), moderately low (71–85), and low ($\leq 70$).

This measure has been widely used in clinical, educational and research settings for a variety of populations such as autism (e.g. Pugliese et al., 2015; Szatmari et al., 2015) Down syndrome (Hahn, Fidler, & Hepburn, 2014) and other neurodevelopmental disorders (Chatham et al., 2018). It has been found that cognitive and adaptive composite scores are highly correlated (e.g. Kenworthy, Case, Harms, Martin, & Wallace, 2010; Liss et al., 2001; Vig & Jedrysek, 1995). The Vineland-II is used in this study as an indicator of adaptive functioning of participants. This was included as a measure to control developmental differences.

3.4 Data analysis

Data analysis was conducted using the Statistical Package for the Social Sciences 25 (SPSS 25). A series of Mann-Whitney U Tests were used to analyse the data in each of the three stages. Additionally, an independent t-test was conducted to compare the Vineland-II
receptive language scores between the different groups in each of the three stages. This was included as a measure to control developmental differences. Preliminary analyses identified non-normed data distribution. In addition, data were ordinal, therefore non-parametric measures were used with significance determined by $p < .05$. The effect size for each comparison was calculated using Cohen’s $d$ (Cohen, 1988) with a value of 0.1 considered a small effect, 0.3 a medium effect and 0.5 a large effect.
Table 7.

Data Analysis per Stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>Data Analysis Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1 - comparison of higher than mean (group 1) and lower than mean (group 2) restricted and repetitive behaviours</td>
<td>A series of Mann-Whitney U Tests were used to analyse and compare group 1 and 2 against each item of the PEM-CY school section for attendance and involvement. An independent t-test was conducted to compare the Vineland-II receptive language scores for higher and lower than mean restricted and repetitive behaviours.</td>
</tr>
<tr>
<td>Stage 2a - comparison of two groups of participants that gained non-elevated (group 1) or elevated (group 2) scores of lower order restricted and repetitive behaviours</td>
<td>A series of Mann-Whitney U Tests were used to analyse and compare group 1 and 2 against each item of the PEM-CY school section for attendance and involvement. An independent t-test was conducted to compare the Vineland-II receptive language scores for group 1 or group 2 scores of lower order restricted and repetitive behaviours</td>
</tr>
<tr>
<td>Stage 2b - comparison of two groups of participants that gained non-elevated (group 1) or elevated (group 2) scores of higher order restricted and repetitive behaviours.</td>
<td>A series of Mann-Whitney U Tests were used to analyse and compare group 1 and 2 against each item of the PEM-CY school section for attendance and involvement. An independent t-test was conducted to compare the Vineland-II receptive language scores for group 1 or group 2 scores of higher order restricted and repetitive behaviours</td>
</tr>
</tbody>
</table>
3.4.1 Stage 1 Analysis. In Stage 1 participants were divided into two groups based on the mean score of restricted and repetitive behaviours. Participants were classified based on whether they were above or below the mean score. To determine above and below mean restricted and repetitive behaviour scores the total scores of 12 items were calculated with scores ranging from 0 (never) to 2 (often). The mean score was calculated as 1.5, SD = 0.502. Participants who scored 1.5 and over were assigned as group 1 - higher than mean score. Participants who score below 1.5 were assigned as group 2 - lower than mean score.

An independent t-test was conducted for group 1 and 2 to identify any significant differences in receptive language scores using data from the Vineland Adaptive Behaviour Scale (Sparrow, Balla, Cicchetti, Harrison, & Doll, 1984). Group 1 and 2 were then compared against each item of the PEM-CY school section for attendance and involvement. A Mann-Whitney U test was used as the data were ordinal, and initial analyses identified the data were violating assumptions for the use of parametric tests.

3.5 Stage 2 Analysis

3.5.1 Stage 2a analysis. In Stage 2a data analysis compared two groups of participants that gained elevated or non-elevated scores of lower order restricted and repetitive behaviours. Participants were classified as having elevated or non-elevated lower order restricted and repetitive behaviour scores based on whether their score was above or below the mean. The mean scores for total lower order restricted and repetitive behaviours were calculated for each participant and then compared to the whole group mean score. The whole group mean score was 1.34, SD = 0.474, so individual scores under this mean were ranked as non-elevated and assigned as group 1 and scores above this mean were ranked as elevated and assigned as group 2. An independent t-test was conducted for group 1 and 2 to identify any significant differences in receptive language scores. As with data analysis in
stage 1, group 1 and 2 were compared against each item of the PEM-CY school section for attendance and involvement using Mann-Whitney U tests.

3.5.2 Stage 2b analysis. In Stage 2b data analysis compared two groups of participants that gained elevated or non-elevated scores of higher order restricted and repetitive behaviours. Participants were classified as having elevated or non-elevated higher order restricted and repetitive behaviour scores based on whether their score was above or below the mean. The mean scores for total higher order restricted and repetitive behaviours were calculated for each participant and then compared to the whole group mean score. The whole group mean score was 1.42 SD = 0.496, so individual scores under this mean were ranked as non-elevated and assigned as group 1 and scores above this were ranked as elevated and assigned as group 2. As with data analysis in stage 1 and 2a, group 1 and 2 were compared against each item of the PEM-CY school section for attendance and involvement using Mann-U Whitney tests. An independent t-test was conducted for group 1 and 2 to identify any significant differences between groups based on receptive language scores.

3.6 Results

3.6.1 Stage 1 analyses of higher and lower than mean restricted and repetitive behaviours at PEM-CY item level. Results from Stage 1 analysis are shown in Table 8. A Mann-Whitney U Test revealed no significant differences between the group of participants that show higher than mean restricted and repetitive behaviours and the group that show lower than mean restricted and repetitive behaviours in either frequency or involvement in each of the five participation areas.

Caregivers reported that children in both groups (higher than mean restricted and repetitive behaviours and lower than mean restricted and repetitive behaviours) attended classroom activities at least several times a week on average (mean 6.51 and 6.64 respectively). However, both groups were less likely to attend field trips or participate in
school sponsored teams, clubs or organisations. Special roles at school (e.g. lunch room
supervisor, student mentor) were the least attended activities, with children participating less
than once in the last four months. Caregivers stated that children in both groups were
somewhat involved in any activities that they attended.

An independent t-test was conducted to compare the Vineland-II receptive language
scores for higher and lower than mean restricted and repetitive behaviours. There was no
significant difference in scores for higher than mean restricted and repetitive behaviour
scores (\(M = 9.12, SD = 2.96\)) and lower than mean restricted and repetitive behaviour scores
(\(M = 9.57, SD = 2.78; t(138) = 0.942, p = 0.38, \) two-tailed). The magnitude of the
differences in the means (mean difference = 0.46, 95% CI: -0.5 to 1.42) was very small (\(\eta^2 = 0.006\)). This indicated that there were no group differences due to other factors
assessed.
## Restricted and Repetitive Behaviours and Participation at School

### Table 8. Results of Analyses of Higher and Lower than Mean Restricted and Repetitive Behaviours at PEM-CY Item Level

<table>
<thead>
<tr>
<th>Participation items</th>
<th>Frequency, mean (SD) range</th>
<th>Involvement, mean (SD) range</th>
<th>p-value</th>
<th>r</th>
<th>p-value</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Classroom activities (e.g. group work, classroom discussions, tests, in-class assignments)</td>
<td>6.51 (1.52) 7</td>
<td>6.64 (1.21) 7</td>
<td>.793</td>
<td>.02</td>
<td>3.17 (0.97) 4</td>
<td>.973</td>
</tr>
<tr>
<td>2. Field trips and school events (e.g. going to the museum, the school fair, spring concert or play, dances, fundraisers)</td>
<td>2.18 (1.27) 5</td>
<td>1.97 (1.33) 5</td>
<td>.328</td>
<td>.08</td>
<td>3.57 (1.05) 4</td>
<td>.560</td>
</tr>
<tr>
<td>3. School sponsored teams, clubs and organisations (e.g. groups, clubs teams, student council)</td>
<td>2.48 (2.56) 6</td>
<td>2.66 (2.39) 6</td>
<td>.779</td>
<td>.02</td>
<td>3.36 (1.22) 4</td>
<td>.981</td>
</tr>
<tr>
<td>4. Getting together with peers outside of class (e.g. hanging out during lunch, at recess, or other breaks during the school day)</td>
<td>5.46 (2.31) 7</td>
<td>5.64 (2.31) 7</td>
<td>.307</td>
<td>.09</td>
<td>3.42 (1.38) 4</td>
<td>.732</td>
</tr>
<tr>
<td>5. Special roles at school (e.g. lunch room supervisor, student mentor)</td>
<td>0.89 (1.95) 7</td>
<td>0.65 (1.39) 7</td>
<td>.800</td>
<td>.02</td>
<td>2.95 (1.34) 4</td>
<td>.449</td>
</tr>
</tbody>
</table>

*p* = Mann-Whitney U Test  
*r* = Cohen’s d
3.6.2 Stage 2a analysis of elevated and non-elevated lower order restricted and repetitive behaviours at PEM-CY item level. Table 9 shows the results of Stage 2a analyses. Mann-Whitney U Tests revealed a significant difference in one area. This difference related to the question ‘getting together with peers outside of class’, between participants that showed elevated lower order restricted and repetitive behaviours ($Md = 6.0$, $n = 44$) and participants that showed non-elevated lower order restricted and repetitive behaviours ($Md = 7.0$, $n = 87$), $U = 1525.5$, $z = -2.076$, $p = 0.038$, $r = .181$, reflecting a small to medium size effect according to Cohen’s $d$ (Cohen, 1988).
<table>
<thead>
<tr>
<th>Participation items</th>
<th>Frequency, mean (SD) range</th>
<th>Involvement, mean (SD) range</th>
<th>p-value</th>
<th>r</th>
<th>p-value</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children with elevated lower order restricted and repetitive behaviour score</td>
<td>Children with non-elevated lower order restricted and repetitive behaviour score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Classroom activities (e.g. group work, classroom discussions, tests, in-class assignments)</td>
<td>6.42 (1.29) 7</td>
<td>6.65 (1.29) 7</td>
<td>.063</td>
<td>.16</td>
<td>3.02 (1.08) 4</td>
<td>3.24 (0.95) 4</td>
</tr>
<tr>
<td>2. Field trips and school events (e.g. going to the museum, the school fair, spring concert or play, dances, fundraisers)</td>
<td>2.22 (1.40) 5</td>
<td>2.00 (1.24) 5</td>
<td>.432</td>
<td>.07</td>
<td>3.64 (1.06) 4</td>
<td>3.62 (0.98) 4</td>
</tr>
<tr>
<td>3. School sponsored teams, clubs and organisations (e.g. groups, clubs teams, student council)</td>
<td>2.39 (2.54) 6</td>
<td>2.66 (2.44) 6</td>
<td>.701</td>
<td>.03</td>
<td>3.12 (1.40) 4</td>
<td>3.45 (1.20) 4</td>
</tr>
<tr>
<td>4. Getting together with peers outside of class (e.g. hanging out during lunch, at recess, or other breaks during the school day)</td>
<td>5.07 (2.56) 7</td>
<td>5.79 (2.14) 7</td>
<td>.038</td>
<td>.18</td>
<td>3.42 (1.48) 4</td>
<td>3.40 (1.18) 4</td>
</tr>
<tr>
<td>5. Special roles at school (e.g. lunch room supervisor, student mentor)</td>
<td>1.00 (2.06) 7</td>
<td>0.66 (1.48) 7</td>
<td>.799</td>
<td>.02</td>
<td>2.38 (1.36) 4</td>
<td>2.96 (1.45) 4</td>
</tr>
</tbody>
</table>

p = Mann-Whitney U Test

r = Cohen’s d
To further analyse these results and explore the pattern of behaviour, the frequency of results was displayed using a box plot (Fig 4). In Figure 4 the non-elevated group had a small number of outliers and extreme points, with the remaining members of this group reporting to get together with peers at least a few times a week. The participants in the elevated group showed that around 50% reported that they get together with peers outside of class at least a few times a week, 25% a few times a month to once a month, and a further 25% not at all to monthly.

![Boxplot graph of elevated and non-elevated restricted and repetitive behaviour scores for PEM-CY item frequency of 'getting together with peers outside of class.'](image)

An independent t-test was conducted to compare the receptive language scores for elevated and non-elevated low order restricted and repetitive behaviours. There was no significant difference in scores for elevated low order restricted and repetitive behaviour scores ($M = 8.91, SD = 2.77$) and non-elevated low order restricted and repetitive behaviour scores ($M = 9.56, SD = 2.91$; $t (138) = 1.26, p = 0.21$, two-tailed). The magnitude of the
differences in the means (mean difference = 0.64, 95% CI: -0.37 to 1.66) was small (eta squared = 0.011). This indicated that there were no group differences assessed.

3.6.3 Stage 2b analyses of elevated and non-elevated higher order restricted and repetitive behaviours at PEM-CY item level. The results of Stage 2b analyses are displayed in Table 10. The results in the area of elevated and non-elevated higher order restricted and repetitive behaviours indicate that children get together with peers outside of class at least once a week (mean 5.42 and 5.65 respectively). In concurrence with results in the previous two analyses, caregivers reported that their children attended classroom activities at least a few times a week and did not participate often in special roles at school. On average, all children were somewhat involved in all activities attended.
### Table 10. Results of Analyses of Elevated and Non-Elevated Higher Order Restricted and Repetitive Behaviours at PEM-CY Item Level

<table>
<thead>
<tr>
<th>Participation items</th>
<th>Frequency, mean (SD)</th>
<th>Involvement, mean (SD)</th>
<th>p-value</th>
<th>r</th>
<th>p-value</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Children with</td>
<td>Children with</td>
<td></td>
<td></td>
<td>Children with</td>
<td>Children with</td>
</tr>
<tr>
<td></td>
<td>elevated higher</td>
<td>non-elevated higher</td>
<td></td>
<td></td>
<td>elevated higher</td>
<td>non-elevated higher</td>
</tr>
<tr>
<td></td>
<td>order restricted</td>
<td>order restricted</td>
<td></td>
<td></td>
<td>order restricted</td>
<td>order restricted</td>
</tr>
<tr>
<td></td>
<td>and repetitive</td>
<td>and repetitive</td>
<td></td>
<td></td>
<td>and repetitive</td>
<td>and repetitive</td>
</tr>
<tr>
<td></td>
<td>behaviour score</td>
<td>behaviour score</td>
<td></td>
<td></td>
<td>behaviour score</td>
<td>behaviour score</td>
</tr>
<tr>
<td>1. Classroom activities (e.g. group work, classroom discussions, tests, in-class assignments)</td>
<td>6.63 (1.26) 7</td>
<td>6.53 (1.46) 7</td>
<td>.626</td>
<td>.04</td>
<td>3.14 (0.94) 4</td>
<td>3.19 (1.04) 4</td>
</tr>
<tr>
<td>2. Field trips and school events (e.g. going to the museum, the school fair, spring concert or play, dances, fundraisers)</td>
<td>2.12 (1.23) 5</td>
<td>2.04 (1.35) 5</td>
<td>.667</td>
<td>.04</td>
<td>3.57 (1.09) 4</td>
<td>3.67 (0.93) 4</td>
</tr>
<tr>
<td>3. School sponsored teams, clubs and organisations (e.g. groups, clubs teams, student council)</td>
<td>2.65(2.61) 6</td>
<td>2.51 (2.38) 6</td>
<td>.607</td>
<td>.05</td>
<td>3.47 (1.24) 4</td>
<td>3.26(1.29) 4</td>
</tr>
<tr>
<td>4. Getting together with peers outside of class (e.g. hanging out during lunch, at recess, or other breaks during the school day)</td>
<td>5.42 (2.38) 7</td>
<td>5.65 (2.25) 7</td>
<td>.451</td>
<td>.07</td>
<td>3.34 (1.33) 4</td>
<td>3.45 (1.24) 4</td>
</tr>
<tr>
<td>5. Special roles at school (e.g. lunch room supervisor, student mentor)</td>
<td>0.68 (1.70) 7</td>
<td>0.85 (1.71) 7</td>
<td>.244</td>
<td>.10</td>
<td>2.86 (1.29) 4</td>
<td>2.70 (1.52) 4</td>
</tr>
</tbody>
</table>

*p* = Mann-Whitney U Test  

*r* = Cohen’s d
An independent t-test was conducted to compare the receptive language scores for elevated and non-elevated high order restricted and repetitive behaviours. There was no significant difference in scores for elevated high order restricted and repetitive behaviour scores ($M = 9.32, SD = 2.81$) and non-elevated high order restricted and repetitive behaviour scores ($M = 9.36, SD = 2.93$; $t (138) = 0.73, p = 0.94$, two-tailed). The magnitude of the differences in the means (mean difference $= 0.036, 95\% CI$: -0.94 to 1.01) was very small (eta squared $= 0.003$). This indicated that there were no group differences due to other factors assessed.

4. Discussion

Research to date investigating restricted and repetitive behaviours has been limited compared to the research conducted about social and communication difficulties (Berry et al., 2018). Studies have predominantly focused on definition, change and cause (Leekam et al., 2011). Research consists mainly of clinical observations with very few being in natural contexts (Kirby et al., 2016). No studies of restricted and repetitive behaviours to date have focused on the effects of participation in education.

The main purpose of this study is to develop a specific understanding of the effect of restricted and repetitive behaviours on school participation for children with autism through data collection and analysis. This potentially will assist to identify ways to remove the barriers restricting attendance and involvement for students with autism in mainstream schooling. The following research questions specify the type of data collected in the study:

_How do restricted and repetitive behaviours influence the participation of children with autism in school contexts?_

This will be addressed by two sub-questions:
Research sub-question 1: *How do differing levels of restricted and repetitive behaviours influence attendance and involvement of children with autism in school activities?*

Research sub-question 2: *How do differing types of restricted and repetitive behaviours influence attendance and involvement of children with autism in school activities?*

In Stage 1 participants were divided into two groups based on the mean score of restricted and repetitive behaviours. Participants were classified based on whether they were above or below the mean score of 1.5, SD = 0.502. Participants that scored 1.5 and over were assigned as group 1- higher than mean score. Participants that score below 1.5 were assigned as group 2- lower than mean score.

In Stage 2a data analysis compared two groups of participants that gained elevated or non-elevated scores of lower order restricted and repetitive behaviours. Participants were classified as having elevated or non-elevated lower order restricted and repetitive behaviour scores based on whether their score was above or below the mean. The whole group mean score was 1.34, SD = 0.474, so individual scores under this mean were ranked as non-elevated and assigned as group 1 and scores above this mean were ranked as elevated and assigned as group 2.

In Stage 2b data analysis compared two groups of participants who gained elevated or non-elevated scores of higher order restricted and repetitive behaviours. Participants were classified as having elevated or non-elevated higher order restricted and repetitive behaviour scores based on whether their score was above or below the mean. The whole group mean score was 1.42 SD = 0.496, so individual scores under this mean were ranked as non-elevated and assigned as group 1 and scores above this were ranked as elevated and assigned as group 2.
RESTRICTED AND REPETITIVE BEHAVIOURS AND PARTICIPATION AT SCHOOL

There was a significant result in stage 2 a data analysis. In the participation item getting together with peers outside of classroom based on lower order restricted and repetitive behaviours. Children who were reported to demonstrate elevated scores on lower order restricted and repetitive behaviours were found to get together with peers outside the classroom less frequently than children with non-elevated scores.

The receptive language analysis for each of the three groups showed that there was no difference in scores for the two groups of participants displaying higher than mean restricted and repetitive behaviours and those displaying lower than mean restricted and repetitive behaviours. Additionally, there was no receptive language score difference between the groups of participants who displayed elevated/ non-elevated lower order restricted and repetitive behaviours, or with the groups of participants who displayed elevated/ non-elevated higher order behaviours. This is contrary to other studies.

The results from the research sub-question 1, which investigated whether higher than or lower than mean restricted and repetitive behaviour scores impact on attendance and involvement of children with autism in school activities, showed no significant differences. In all participation items in the PEM-CY, both groups scored very similarly. However, it was shown that students in both groups attended classroom activities most frequently, followed by getting together with peers outside of class. Irrespective of type of restricted and repetitive behaviours, children with autism spend less time attending school sponsored teams, clubs and organisations, and field trips and school events. The least attended activity was special roles, such as lunch room supervisor.

Research sub-question 2 was organised into two parts. Part A related to the difference between effect of elevated and non-elevated lower order behaviours on participation. Part B related to the difference between elevated and non-elevated higher order behaviours. The research conducted in the second research sub-question, part A found no significant
difference between groups in participation in classroom activities, field trips, school sponsored teams and special roles at school.

The outcome for the second research sub-question, part B observing the difference between elevated and non-elevated higher order behaviours on participation also revealed no significant results. The results in this area were similar to the results in sub-question 1. Children in both groups attended classroom activities the most frequently with getting together with peers being the next most attended activity. They attended school sponsored teams and field trips less often and had the lowest attendance score in special roles in class.

4.1 Results Compared to Restricted and Repetitive Literature

The purpose of this study was to determine whether differing levels and types of restricted and repetitive behaviours have an effect on participation in the school context. The results show that neither levels of, or type of restricted and repetitive behaviours had an effect on participation in classroom activities, field trips, team activities or special roles at school for this group of children. This appears to contradict some of the research regarding restricted and repetitive behaviours.

The APA explains that restricted and repetitive behaviours range from low severity; having trouble with transitions, planning and organisation, to high severity; having frequent displays of restricted/ repetitive behaviours that are noticeable to others, in multiple contexts, where individuals require substantial support to function (American Psychiatric Association, 2013). As part of the diagnostic criteria, all children with autism display some level of restricted and repetitive behaviours.

Even at a low severity level, it is understood that individuals have difficulty with transitions, planning and organisation. It has been observed that students with autism have difficulty shifting attentional focus, due to insistence on sameness behaviours (higher order behaviours). Changes in schedules or activities during school time is a common occurrence.
and this has implications for students in the classroom when facing daily transitions from one activity to another (Joosten et al., 2012; Richler et al., 2007; Sparapani et al., 2016).

Insistence on sameness behaviours have also been linked to intolerance of uncertainty, causing individuals to regard any unfamiliar events as situations to be avoided (Boulter, Freeston, South, & Rodgers, 2014; Buhr & Dugas, 2009). This would cause difficulties for children going on field trips or attending a school fete for example. Moreover, unknown places, people or events can contribute to anxiety, whereupon individuals may engage in restricted and repetitive behaviours in order to exert control (Lidstone et al., 2014; Rodgers et al., 2012; Wigham et al., 2015). This could potentially affect many aspects of a school day such as the arrival of a relief teacher, or a fire drill or lockdown. The results from the study did not show any difference in participation between participants with elevated and non-elevated higher order behaviours, despite the literature suggesting otherwise.

Additionally, it was thought that the study may indicate that repetitive motor behaviours (lower order behaviours) interfere with engagement in classroom-based activities. Research states that individuals who are engaged in repetitive motor behaviours are less able to physically participate in leisure activities in the home and in the community (Hilton et al., 2007; Hochhauser & Engel-Yeger, 2010). It is expected that this would also be the case in the school context. Moreover, a person who is occupied with repetitive motor behaviours may miss out on critical information that prevents them from participating in activities (Richler et al., 2010) potentially affecting the ability to work in class and join in team activities.

This study shows that children with elevated lower order restricted and repetitive behaviours participate less in getting together with peers outside of the classroom. This result is concurrent with previous research on the effect of restricted and repetitive behaviours on socialisation. Literature indicates that restricted and repetitive behaviours and interests can affect socialisation by diminishing the likelihood of engaging in positive peer interaction.
Repetitive behaviours and interests can be socially stigmatising (Szatmari et al., 2006), interfering with the opportunity to make friends (Rodgers, Glod, Connolly, & McConachie, 2012). Rotheram-Fuller, Kasari, Chamberlain, and Locke (2010) identified a dramatic drop in peer relationships in late primary school for individuals with autism. It is suggested that this is because peers become more aware of differences between themselves and children with autism and worry about the stigma associated with playing with a child that no-one else wants to play with. In addition, typically developing peers become less tolerant of differences and peculiar behaviour (Rotheram-Fuller et al., 2010).

Furthermore, it has been found that circumscribed interests can influence conversation (Nadig, Lee, Singh, Bosshart, & Ozonoff, 2010). Individuals with autism often have a topic that interests them in particular. However, the compulsion to talk about one topic can result in one-sided stereotyped conversations and does not facilitate reciprocal interaction. These intense preoccupations may hinder the development of relationships and limit social participation (Boyd et al., 2010; Reynolds, Bendixen, Lawrence, & Lane, 2011). Although circumscribed interests are categorised as higher order behaviours, the combination of these behaviours and repetitive motor behaviours could contribute to the lower score in socialising with peers outside of class. Nevertheless, it is likely that there is a combination of many factors, both internal and external to the individuals who have produced this result.

### 4.2 Receptive Language

Interestingly, the receptive language analysis for each of the three groups, used in this study as an indicator of adaptive functioning of participants, yielded results contrary to research (e.g Bishop et al., 2013; Boyd et al., 2009; Harrop et al., 2014; Lam & Aman, 2007; Ray-Subramanian & Weismer, 2012). In the study, there was no difference in levels of receptive language scores for the two groups of participants displaying higher than mean restricted and repetitive behaviours and those displaying lower than mean restricted and
repetitive behaviours. Additionally, there was no receptive language score difference between
the groups of participants who displayed elevated/ non-elevated lower order restricted and
repetitive behaviours, or with the groups of participants that displayed elevated/ non-elevated
higher order behaviours.

These results contradict research that states that higher levels of restricted and
repetitive behaviours are associated with children with lower receptive language skills and
non-verbal cognitive skills (Bishop et al., 2013; Boyd et al., 2009; Harrop et al., 2014; Lam
& Aman, 2007; Ray-Subramanian & Weismer, 2012). The results also contradict literature
that reports that higher order behaviours are more likely to be observed in individuals with
higher cognitive abilities (Bishop et al., 2006; Joseph et al., 2013; Watt et al., 2008) or that
lower order restricted and repetitive behaviours are more persistent and severe in children
with lower IQ (Bishop et al., 2006; Esbensen et al., 2009; Rao & Landa, 2014).

The lack of significant results could be attributed to a number of factors. Some
research suggests that restricted and repetitive behaviours, particularly lower order
behaviours, decrease over time. It could also be that there are a number of supports that have
been put in place for the students in this study to manage their restricted and repetitive
behaviours at school. The participants of this study are 9-10 years old and would be in year 4
or 5 at primary school. It is possible that they have adjustments such as visual timetables,
mufflers for noise management, and adjusted curriculum, to help reduce the likelihood of
engaging in restricted and repetitive behaviours. The students in this cohort would also be
familiar with the routines and schedules of a typical school day, and possibly the staff and
other students in the classroom and around the school. Students may also have the benefits of
medication or external therapies to help them manage their restricted and repetitive
behaviours.
4.3 Comparison to other Participation Literature

The results from the PEM-CY section in this study were contrasted with previously published results from a study conducted by Coster et al. (2013) comparing school participation patterns of students aged 5-17 years old with and without disabilities. Some frequency scores were comparable between studies. The study by Coster and colleagues revealed that primary school aged children with disability attended classroom activities with a mean frequency of 6.63 (SD 1.01). The scores for frequency of attendance in classroom activities for children in this study were very similar. Students who displayed above mean restricted and repetitive behaviours had a mean attendance frequency of 6.51 (SD 1.52) and those that displayed below mean restricted and repetitive behaviours had a mean attendance frequency of 6.64 (SD 1.21).

Additionally, students with disability from the Coster et al. study had a mean attendance frequency of 2.31 (SD 1.29) for field trips and school events. Correspondingly, children from this study with above mean restricted and repetitive behaviours had a mean frequency of attendance of 2.18 (SD 1.27). The final close correlation was in the frequency of getting together with peers outside of class. The students with disability in the study by Coster et al. had a mean frequency of 5.29 (SD 1.16) and the students with higher than mean restricted and repetitive behaviours in this study had a mean frequency of 5.46 (SD 2.31).

Lastly, the students with disability in the study by Coster et al. had a markedly higher mean frequency of attendance in special roles at school (4.09 SD 1.65) than students in this study (0.89 SD 1.95). This may in part be due to the difference in special roles assigned for students in Australian class rooms, where this study was conducted, compared to those in Canadian and American schools, where the study by Coster et al. was conducted. Indeed, caution should be used in the comparison between these two studies due to the cultural differences. However, it is clear that students in primary school with disability participate less
in all school activities compared to their non-disabled peers. These results highlight the continuing challenges in facilitating meaningful inclusion for students with disability in the full range of activities taking place in mainstream schools.

4.4 Limitations

The non-significant results from this research do not necessarily mean that restricted and repetitive behaviours do not affect participation in school for children with autism. There are limitations to the study that may have had an effect on the results. The responses for this study were collected via online surveys, and it is possible that different results could have been obtained if the survey was delivered face to face or in a paper format. Additionally, parents and caregivers, mostly mothers, were the primary responders to both surveys used. It is difficult for parents to report on what happens at school, particularly when asked about involvement in a specific activity. The information gathered from parent report measures is also subjective, which can be problematic (Richler et al., 2010). There might also be a difference in opinion between the child and their parents if the child were to be given the opportunity to self-rate their behaviours and their attendance/degree of involvement in school activities (Egilson, Ólafsdóttir, Leósdóttir, & Saemundsen, 2017; Hemmingsson, Ólafsdóttir, & Egilson, 2017; Law et al., 2013). Using multiple raters including teachers or other school-based staff able to observe the child may be more effective.

These findings should also be considered in the context of the study. Respondents on average reported higher levels of household income and higher levels of education than that of the general Australian population (ABS, 2017) meaning that that the sample may not be representative of the entire population. The study design did not allow for direct observation of participation at school or of cognitive ability. The sample is also Australian and the level of inclusion in mainstream schooling may not reflect the levels in other schools around the world.
4.5 Significance of the Study

There is growing evidence to show that children with autism learning in mainstream educational environments are facing substantial challenges. Of the children diagnosed with autism attending mainstream schools, 83.7 per cent experienced difficulties in their place of learning. Students reported that their main areas of difficulty were fitting in socially (63.0%), learning difficulties (60.2%) and communication difficulties (51.1%) (ABS, 2017). The long-term impact of ineffectual educational supports is becoming more apparent. Many adults with autism are unemployed and experience limited independence (Moss, Howlin, Savage, Bolton, & Rutter, 2015). Additionally, a recent systematic review classed outcomes in social integration and independence as ‘poor’ or ‘very poor’ with adults with autism being largely dependent on parents or carers for support for living arrangements and employment (Magiati, Tay, & Howlin, 2014).

While there is some understanding of the long-term outcomes for adults with autism (Howlin et al., 2014; Magiati et al., 2014) it is necessary to understand the experiences during the school years that influence these outcomes. Despite the documented difficulties of children with autism in mainstream schooling, there is limited information about participation in school, and how the characteristics of autism affect their education. It is necessary to understand the experiences of children with autism in the educational setting, and to explore the impacts of social and communication difficulties, and restricted and repetitive behaviours on those experiences.

Whilst the results of this study were largely non-significant, it has identified areas of low participation for students with autism. The results showed children with elevated lower order behaviours participated less in socialising with peers outside of the classroom. This is concerning as limited or absent peer relationships can negatively influence health and mental health (Bukowski, Laursen, & Hoza, 2010). In addition, the results indicate that special roles
in school was the least represented activity for all students with autism, with the area of field trips and school events following closely behind.

Participation in school sponsored teams, clubs and organisations such as sports teams rated lower than participation in classroom activities and getting together with peers outside of the class overall. This is also important, as the benefits of physical activity are universal for all children. In particular, the participation of children with disabilities in sports and leisure activities is found to reduce symptoms of anxiety and depression (Jin, Yun, & Agiovlasitis, 2017), promote inclusion, improve physical functioning, and improve overall well-being (Murphy & Carbone, 2008).

This information is significant as it begins to highlight the impact of non-participation in school activities. It is also necessary to understand and promote that participation includes all areas of a school day, not just classroom activities. The Disability Standards for Education (2005) state that children with disabilities in Australia have the right to participate in all activities of a school day on the same basis as their non-disabled peers and this needs to be addressed in mainstream educational settings.

4.6 Future Directions

The strength of this study has been that it measured both restricted and repetitive behaviours and participation at school. This is the first study to do so at this point in time. Use of the PEM-CY as a participation measure has also allowed for comparison with other literature. Future studies could begin to investigate student perspectives on school participation in order to get a fuller picture of how participation is affected by the characteristics of autism. Additionally, it is important to obtain ratings from professionals in the school environment who are familiar with the students and can directly observe the frequency of participation and levels of involvement. Further investigation also needs to be conducted with more diverse samples to further increase understanding how child
characteristics of autism, such as restricted and repetitive behaviours affect participation in other geographical, economic and cultural contexts. Finally, it will be valuable to follow up with the students in this cohort after their transition to high school to monitor the way restricted and repetitive behaviours potentially affect participation in an unfamiliar environment.
References


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