

OCCUPATIONAL THERAPY INTERVENTIONS FOR RESTRICTED AND  
REPETITIVE BEHAVIORS WITH AUTISM

by

Melissa Patriquin

Submitted in partial fulfilment of the requirements  
for the degree of Master of Science

at

Dalhousie University  
Halifax, Nova Scotia  
November 2018

© Copyright by Melissa Patriquin, 2018

## DEDICATION

I would like to dedicate this body of work to my children Sophie and Mason and husband Jason who encouraged and supported me to pursue my passion and achieve this goal. I also want to thank my mother Marlene who has always inspired me to continue to learn and advance my education.

**TABLE OF CONTENTS**

**LIST OF TABLES ..... viii**

**LIST OF FIGURES ..... ix**

**ABSTRACT..... x**

**LIST OF ABBREVIATIONS USED..... xi**

**ACKNOWLEDGEMENTS ..... xii**

**CHAPTER 1 INTRODUCTION ..... 1**

**1.1 Personal Incentives for Study ..... 1**

**1.2 ASD and Restricted and Repetitive Behavior ..... 2**

**1.3 Occupational Well-Being ..... 3**

**1.4 Engagment in Occupation..... 4**

**1.5 Thesis Overview ..... 6**

**CHAPTER 2 INTEGRATIVE REVIEW ..... 7**

**2.1 ABSTRACT ..... 7**

        2.1.1 Objective. .... 7

        2.1.2 Background. .... 7

2.1.3 Methods.....	8
2.1.4 Results.....	8
2.1.5 Conclusion.....	8
<b>2.2 Introduction.....</b>	<b>8</b>
<b>2.3 Materials and Methods.....</b>	<b>12</b>
2.3.1 Search Strategy.....	12
<b>2.4. Results .....</b>	<b>14</b>
2.4.1 Article Selection and Quality Appraisal.....	14
<b>2.5 Data Analysis.....</b>	<b>36</b>
2.5.1 Intervention Classification by ABA Framework.....	36
2.5.2 Intervention Classification by PEO Model.....	36
<b>2.6 Discussion.....</b>	<b>40</b>
2.6.1 Interventions targeting the Environment.....	40
2.6.2 Interventions targeting the Person.....	42
2.6.3 Interventions targeting Occupation.....	42
2.6.4 Interventions targeting Person and Environment.....	43
2.6.5 Interventions targeting Occupation and Environment.....	43
2.6.6 Interventions targeting Occupation, Environment, and Person.....	43
2.6.7 Occupational therapy and Occupation as part of Intervention for RRB.....	44
2.6.8 Limitations.....	45

2.7 Conclusion .....	46
<b>CHAPTER 3 METHODOLOGY .....</b>	<b>47</b>
3.1 Rationale.....	47
3.2 Research Design .....	47
3.3 Research Questions.....	48
3.4 Recruitment and Sampling .....	48
3.5 Participant Informed Consent.....	50
3.6 Methods and Analysis.....	50
3.7 Risk and Benefit Analysis.....	52
3.8 Privacy and Confidentiality .....	53
3.9 Roles and Duties of the Research Team.....	54
<b>CHAPTER 4 DESCRIPTIVE INTERVIEW STUDY .....</b>	<b>56</b>
4.1 Abstract.....	56
4.2 Introduction.....	56
4.3 Methods.....	59
4.3.1 Study design. ....	59
4.3.2 Recruitment. ....	59

4.3.3 Participants and Data Collection.....	60
4.3.4 Analysis.....	61
<b>4.4 Results.....</b>	<b>63</b>
4.4.1 Thematic analysis.....	63
4.4.2 Content analysis.....	71
<b>4.5 Discussion.....</b>	<b>78</b>
4.5.1 Similarities between interventions to address RRB reported by Occupational Therapists interviewed and evidenced based interventions.....	79
4.5.2 Differences: Occupational therapists tend to focus on different parts of the PEO and ABA models compared to the evidenced based interventions. .	82
4.5.3 Additional Intervention Options: How to decide.....	84
<b>4.6 Study Limitations.....</b>	<b>87</b>
<b>4.7 Future Direction.....</b>	<b>88</b>
<b>CHAPTER 5 CONCLUSION .....</b>	<b>90</b>
<b>5.1 Summary.....</b>	<b>90</b>
<b>5.2 Implications for Occupational Therapy practice.....</b>	<b>90</b>
<b>5.3 Implications for Occupational Therapy Education .....</b>	<b>93</b>
<b>5.4 Implications for Occupational Therapy Research.....</b>	<b>94</b>
<b>5.5 Personal Educational Pursuit .....</b>	<b>95</b>

<b>REFERENCES.....</b>	<b>97</b>
<b>APPENDIX A: RECRUITMENT EMAIL .....</b>	<b>107</b>
<b>APPENDIX B: STUDY INFORMATION LETTER.....</b>	<b>109</b>
<b>APPENDIX C: INFORMED CONSENT FORM.....</b>	<b>112</b>
<b>APPENDIX D: INTERVIEW QUESTIONS .....</b>	<b>119</b>
<b>APPENDIX E: VERBAL CONSENT FORM .....</b>	<b>121</b>

## LIST OF TABLES

<b>Table 1</b> Summary of Articles Included in the Integrative Review .....	15
<b>Table 2.</b> Classification and analysis of effective RRB interventions that target person, environment or occupation .....	27
<b>Table 3.</b> RRB Intervention Classification and Comparison between ABA approach and the PEO Model of Occupational Performance .....	37
<b>Table 4.</b> Interventions Reported, mapped onto the PEO and ABA Frameworks .....	73



## LIST OF FIGURES

<b>Figure 1: Search and Selection Process</b> .....	13
---	----

## **ABSTRACT**

Restricted and repetitive behaviors (RRBs) are a problematic behavior experienced by individuals with Autism Spectrum Disorder that potentially interferes with engagement in meaningful occupations for that person. The purpose of this work was to 1) Identify evidenced based interventions effective in addressing RRBs that fall within an occupational therapy scope of practice; 2) Discover interventions occupational therapists are using to address RRBs; and 3) Determine how those interventions relate to known evidenced based interventions. To achieve these goals an integrative review was completed, identifying twenty-eight evidenced based interventions to address RRBs. Interventions were classified based on an ABA framework and mapped onto the PEO model of occupational performance. A descriptive interview study was completed by interviewing Canadian occupational therapists. Twenty-four interventions reported by therapists interviewed and four core themes related to occupational therapy practice, RRBs, and ASD were revealed. This study highlighted implications for occupational therapy practice, education, and research.

## **LIST OF ABBREVIATIONS USED**

RRB: Restricted and Repetitive behaviors

ASD: Autism Spectrum Disorder

APA: American Psychological Association

WFOT: World Federation of Occupational Therapists

PEO: Person Environment Occupation

ABA: Applied Behavioral Analysis

## **ACKNOWLEDGEMENTS**

This thesis was completed with the advice and continuous guidance of my supervisors Dr. Diane MacKenzie and Dr. Joan Versnel of Dalhousie's school of Occupational Therapy as well as my third committee member, Dr. Patricia Gerrion who offered ongoing support and a constant willingness to share her knowledge.

## **CHAPTER 1 INTRODUCTION**

### **1.1 Personal Incentives for Study**

Nineteen years ago, as a student about to begin my final practicum in the BSc Occupational therapy program at Dalhousie, I was anxious and excited to soon be starting my career as an Occupational Therapist. Pediatric occupational therapy was my field of choice and I was thrilled to be commencing my placement at the IWK Children's hospital with an occupational therapist who was the Autism Spectrum Disorder (ASD) team lead.

At that time, this therapist had been practicing close to twenty years and was very well known in the occupational therapy community as a local leader in the understanding of children with ASD. I soon discovered why she was regarded in this way by so many. She was a therapist who was completely in love with her job. She was determined to improve the lives of these children by striving to ensure they were functional and engaged in personally meaningful occupations. She introduced me to the magically and puzzling world of ASD and inspired me to follow the career path I did.

In the years that followed, I worked in a variety of settings that initially included part time pediatric caseloads and eventually full time pediatric positions ultimately resulting in a specialized service for preschool aged children with ASD. Even when I was in positions that involved only partial pediatric work I inevitably always ended up seeing clients diagnosed with ASD. With each new child I saw I learned more about this intriguing diagnosis, the suspected causes, the problematic issues experienced by these individuals and families, and the numerous treatment options.

I found over the years that the referrals I tended to receive from parents and other professionals were almost always related to perceived sensory behaviors so often

experienced by children with ASD. Common referrals included such things as food aversions or sensitivities, repetitive spinning or flapping, as well as body awareness. With these referrals I often felt an expectation that an occupational therapist was perceived to be the professional expert in sensory behaviors and sensitivities.

I was very grateful for my experience at the IWK, with that inspiring therapist who had shared so much of her understanding and knowledge with me with respect to the ASD population and intervention. In my early years my first instinct was to consult with fellow occupational therapists in regards to intervention approaches related to these sensory behaviors.

Now with almost twenty years of experience working with this population, I still have many questions in regard to ASD intervention and occupational therapy's role. During my continuous professional quest to answer the unknowns related to ASD and best practice I have attended numerous lectures and workshops, read countless articles and consulted with many colleagues. I also achieved certification in sensory integration beyond my initial occupational therapy education via a long and pricy process.

My goal for this research is to gain greater knowledge related to best practice in occupational therapy intervention for restricted and repetitive behaviors experienced by individuals with ASD.

## **1.2 ASD and Restricted and Repetitive Behavior**

Restricted and repetitive behaviors (RRBs) are one of the key diagnostic traits of ASD spectrum disorder (ASD) (American Psychiatric Association [APA], 2013). RRBs can include repetitive motor movements such as spinning, jumping, or flapping, repetitive

use of objects, and/or over or under reactions to sensory input (APA, 2013). RRBs can affect a person's ability to engage in functional tasks or social interactions when they choose to engage in these restricted and repetitive behaviors rather than the occupations that are expected or considered typical for their age group (Lam & Aman, 2007).

Although RRBs can limit occupation it is also possible that since they are performed repeatedly, it is likely there is a reason or function for that behavior. Considering this may impact the intervention an occupational therapist recommends for his or her clients. I turned to the occupational therapy literature to assist me in answering these uncertainties and help guide my practice.

### **1.3 Occupational Well-Being**

“Occupational well-being is an experience in which people derive feelings of satisfaction and meaning from ways in which they have orchestrated their occupational lives” (Townsend & Polatajko, 2013, p. 69). Occupational well-being is thought to be dependent on the occupations in which one chooses to engage and what those occupations mean to the individual. Townsend & Polatajko (2013) discuss how occupational well-being is fortified when a person's occupations allow them to meet some universal needs including the need to: “a) experience feelings of mastery and achievement, b) contribute to the well-being of others and/or community c) experience a sense of belonging and connection with others d) experience pleasure and fun and e) relax and restore energy levels” (Townsend & Polatajko, 2013, p. 70).

There have been numerous theories related to the function of RRBs with individuals diagnosed with ASD. Some believe RRBs serve to increase or decrease one's level of arousal or to regulate one's emotions. They suggest that “emotion dysregulation may

trigger a compensatory control system expressed by RRBs” (Samson et al., 2014, p 1770). Many researchers believe individuals with ASD perform RRB to decrease negative feelings and increase positive feelings (Rodgers, Glod, Connolly, & McConachie 2012; Wigham, Rodgers, South, McConachie, & Freeston, 2015; Joosten, Bundy, & Einfeld, 2012; Joosten & Bundy, 2010). By helping to regulate emotional reactions and arousal associated with negative feelings such as anxiety, RRBs lead the individual to experience feelings of relaxation and/or pleasure.

Based on what we know about how occupations have an impact on one’s health and occupational well-being it is important to consider the reasons why an individual with ASD may engage in RRB and the impact that engagement has on that individual’s overall well-being. If RRBs are allowing one to regulate an individual’s emotions or level of arousal, perhaps engagement in RRBs enables engagement in meaningful occupations for the child with ASD by decreasing these negative emotions.

#### **1.4 Engagement in Occupation**

The World Federation of Occupational Therapists asserts that occupational therapy is concerned with promoting health and well-being by enabling occupations and that occupations can be those activities considered necessary for daily living or tasks that are important to the person themselves (World Federation of Occupational Therapists [WFOT], 2012). Determining what a client considers an important or meaningful occupation is most often revealed by simply asking the client what is meaningful to them, however this



is difficult with children and adults diagnosed with ASD secondary to language and social communication difficulties.

Durig (1996) suggests that everything each of us does, we do for the most meaningful reason possible. The author explains how all behavior should be seen as a meaningful strategy for coping with the environment. Knowing that individuals with ASD so often engage in RRBs, it seems reasonable that RRBs are serving some function for the individual.

It is also important to consider the impact the cultural environment has on the health and well-being of children with ASD particularly when it is considered unacceptable to perform RRBs within that environment. We know that engagement in RRBs can have both positive and negative consequences (Kiepek & Magalhaes, 2011). When individuals with ASD are engaged in RRBs they often do not participate or engage in other functional behaviors. Some RRBs may even be potentially dangerous or self-injurious. If an occupation is considered meaningful to an individual but it has negative associated consequences, is it contributing to a person's health and well-being?

Kiepek & Magalhaes (2011) argue that some occupations that are viewed by the general public as being unhealthy, may also have positive effects for an individual including enjoyment, social engagement, and stress relief. Alternatively, the authors also discuss the amount of time an individual may spend participating in addiction and impulse control types of occupations explaining that doing so may monopolize such a large amount of time that there is no time left for other occupations. This raises the question, should individuals with ASD be supported, limited, or prevented from engaging in RRBs that may have both positive and negative effects.

## **1.5 Thesis Overview**

This research has aimed to identify how best to address RRBs as part of occupational therapy practice. The remaining sections of this thesis are sequenced in the following way: Chapter 2 is an integrative review of the literature completed to identify current evidenced based interventions to address RRBs with children diagnosed with ASD. As part of this review these interventions were mapped onto an occupational therapy framework, the Person, Environment, Occupation (PEO) model of occupational performance. This allowed the reader to understand how these interventions related to an occupational therapy scope of practice and assisted with further study rationale. Chapter 3 outlines the methodology planned for the qualitative study intended to determine what interventions and clinical reasoning Canadian occupational therapists are currently using to address RRBs in practice and how those interventions relate to the evidenced based interventions identified in Chapter 2. The study results and related discussion are outlined in Chapter 4. Finally, Chapter 5 discusses these findings and the implications for occupational therapy practice, education, and research.

## **CHAPTER 2 INTEGRATIVE REVIEW**

The following chapter is prepared as a manuscript that has been published in the Journal of Intellectual Disabilities Diagnosis and Treatment. This chapter was primarily written by Melissa Patriquin with contribution from Dr. Diane MacKenzie and Dr. Joan Versnel.

### **2.1 ABSTRACT**

#### **2.1.1 Objective.**

To identify evidence-based behavioral interventions used to decrease restricted and repetitive behavior (RRB) in children with ASD (ages 0-18) therefore enabling engagement in age expected occupations. Also, to understand the application of these strategies within the PEO (Person, Environment, Occupation) Model of Occupational Performance and the role of the occupational therapist in addressing this limitation.

#### **2.1.2 Background.**

RRB is a core feature of ASD that often impedes functional behavior including engagement in in age appropriate or expected tasks or occupations. Decreasing RRB to enable functional behaviors is central to the occupational therapist's role with this population. Many interventions identified as effective for this impairment are based on the principles of applied behavior analysis.

### **2.1.3 Methods.**

An integrative review of the literature was completed to identify interventions targeting RRBs. Those found to be effective are described within an ABA framework and within the PEO Model of Occupational Performance.

### **2.1.4 Results.**

This review identified twenty-eight effective interventions used to treat RRBs in ASD relevant to the field of occupational therapy. Categorization of interventions using an ABA framework and the PEO Model allowed comparison between approaches and application to occupational therapy practice.

### **2.1.5 Conclusion.**

An ABA approach used in combination with the PEO model will enable greater understanding of RRBs and provide a more comprehensive approach to the treatment of RRBs in children with ASD.

## **2.2 Introduction**

One of the primary criteria for the diagnosis of ASD spectrum disorder (ASD) is the presence of restricted and repetitive patterns of behavior (RRBs) (American Psychological Association [APA] 2013). Impairments included along the continuum of RRBs may include stereotypical or repetitive motor movements such as continuous jumping or spinning, repetitive use of objects (playing with only one toy for a prolonged length of time) or speech or speech sounds (repeating the same word or sound over a prolonged length of time), insistence on sameness such as wanting to do things in the

same way and having difficulty with changes in routine, highly restricted interests (only talking about or playing with items related to the same topic or theme with little variance), as well as hyper or -hypo reactivity to sensory input (an over-reaction or under-reaction to sensory stimuli) or unusual interest in sensory aspects of the environment (APA, 2013).

RRBs can potentially cause significant functional impairment in the daily lives of children with ASD (Lam & Aman, 2007). RRBs may cause an individual to stand out by making them look and or act differently, potentially affecting social interactions, personal relationships, and possibly leading to social stigmatism and social isolation (Love, Miguel, Fernand, & LaBrie, 2012). In addition, rather than participating in or choosing to perform tasks (occupations) that are typically expected of children their age, children with ASD often participate in activities that may not be considered functional or purposeful such as RRBs. By repetitively performing the same seemingly non-purposeful behaviors these individuals often do not have the opportunity to learn more functional behaviors and acquire skills needed for expected or novel tasks or occupations.

Occupational therapy is concerned with promoting health and well-being through engagement in occupation (World Federation of Occupational Therapists [WFOT], (2012). Occupations include activities or tasks that are considered necessary for daily living (World Federation of Occupational Therapists [WFOT], 2016). Occupations also include those tasks or activities that are important or meaningful to the person them self (WFOT, 2016). For individuals between the ages of 0-18 typical, age appropriate, or expected occupations may include such tasks/activities as progressive independence in

self-care tasks such as dressing, eating, and toileting. Leisure occupations may include such things as play with toys, playing/interacting with friends, perhaps sports, crafts or other hobbies. Progressive independence in productivity occupations could include school work, chores, and/or eventually paid employment (WFOT, 2016). There are sometimes barriers to functional performance in personally meaningful activities. An occupational therapist will aim to help their clients overcome occupational dysfunction by enhancing skills, modifying the environment, and/or altering the occupation.

The Person Environment Occupation (PEO) model of occupational performance (Law et al., 1996) is a practice framework used by occupational therapists to understand the relationship and interactions between the person, the environment, and occupation. The PEO model proposes that the characteristics of the three constructs interact to determine an individual's occupational performance in everyday function. Dysfunctional occupational performance, when an individual is unable to engage in age expected or meaningful occupations can result when there is not a good fit between these constructs. Occupational therapists aim to maximize occupational performance and decrease dysfunction in tasks by influencing change in any, some, or all of these components (Law et al., 1996).

RRB's often act as barriers to functional performance. These barriers may occur secondary to limitations at the 'person' level within the PEO model. For example, perhaps children with ASD engage in RRBs secondary to limited physical, cognitive, or perceptual skills required to perform more functional behaviors. The barrier to functional performance may also be 'occupation' based. For example, the child with ASD may have a stronger preference or have developed a habit for the RRB. Participation in that RRB

may then take the place of participation in a functional or personally meaningful task or occupation. Engagement in occupation may also be limited as a result of the environment in which the occupation is being performed. Perhaps the physical or sensory aspects of the child's environment are acting as barriers to functional performance in that task or occupation.

Given the potential impact RRBs have on the functional ability and quality of life for children with ASD (ages 0-18), occupational therapists have an important role to play with this population. All professionals working with children diagnosed with ASD must be vigilant that the interventions implemented are evidence-based, efficient and effective. A clear understanding of effective interventions to address these concerns is therefore warranted.

Many evidence-based interventions used to address RRBs have been developed based on the field of Applied Behavioral Analysis (ABA). An ABA approach considers the relationship between behavior and the environment: what happens before the behavior occurs, that may trigger the behavior (antecedent) and what happens after the behavior occurs (the consequences) potentially reinforces the behavior. Specifically, the use of Functional Behavioral Assessment (FBA) has allowed a greater understanding of why individuals perform the behaviors they do, including RRB.

Boyd, Mcdonough, & Bodfish (2012) gathered information regarding a variety of approaches used to treat RRB and classified them using an ABA framework. Understanding these behavioral interventions through the lens of the PEO model (Law et al., 1996) will relate these treatments to occupational therapy practice. The purpose of this paper is to identify effective interventions used by clinicians to manage RRB in

children diagnosed with ASD and gain an understanding of how these interventions relate to the role of the occupational therapist using the PEO model.

## **2.3 Materials and Methods**

This integrative review based on Whitemore & Knafl's (2005) approach, aimed to collect and critically examine relevant information regarding effective interventions used to decrease the occurrence of RRBs within an ABA framework and then apply this understanding to occupational therapy using the PEO model (Law et al., 1996). This method allowed direct comparison between both frames of reference. An integrative review includes applicable empirical and theoretical literature that provided a comprehensive understanding of the related concepts (Whitemore & Knafl's, 2005).

### **2.3.1 Search Strategy.**

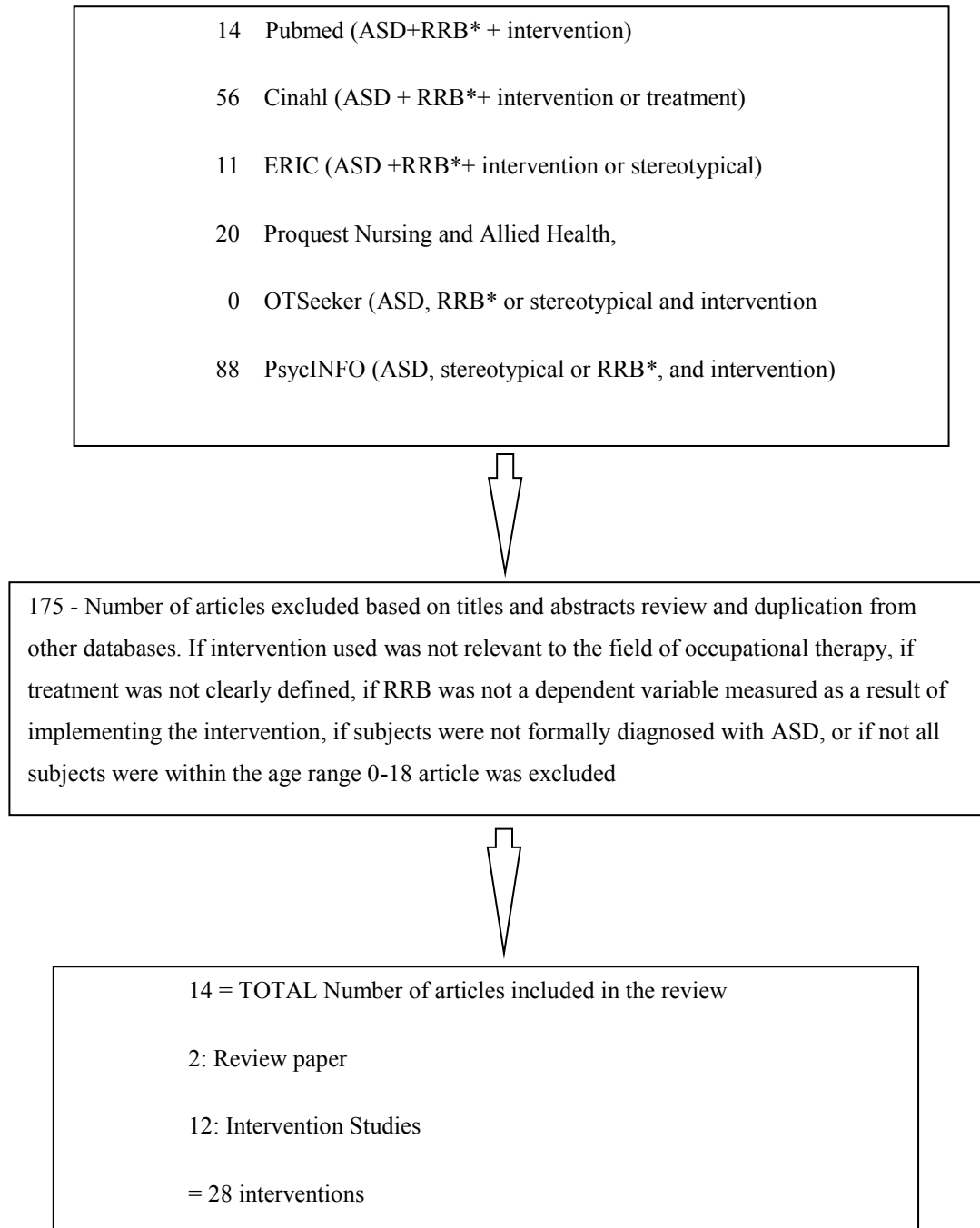
Six electronic databases were searched (Cinahl, ERIC, Proquest Nursing and Allied Health, PubMed, OTSeeker, and PsycINFO) for English language articles published between 2005 and 2015 to ensure the most recent information was examined. Search terms used for this review included ASD, treatment/intervention, and repetitive behavior/stereotypical behavior. Inclusion criteria specified only studies that used human subjects ranging in age from 0-18. The search source types included scholarly articles, journal articles, and books. Qualitative, quantitative, and mixed methodology studies were considered as well as systematic and scoping reviews.

Studies were excluded upon review of the abstracts if the intervention was not relevant to the scope of practice of occupational therapy (i.e. treatment such as use of medication to decrease restricted and repetitive behavior), if treatment was not clearly



defined, and if restricted or repetitive behavior was not a dependent variable. Additional exclusion criteria included articles in which study participants were not diagnosed with ASD and if all study subjects were older than eighteen. The search and selection process are illustrated in Figure 1.

Figure 1: Search and Selection Process



## **2.4. Results**

### **2.4.1 Article Selection and Quality Appraisal.**

After initial searches and review of article abstracts to ensure all inclusion and exclusion criteria were met, fourteen publications, two review papers and twelve individual intervention studies, were included in this review. Search results are presented in Table 1 and organized into two categories for clarity: 1) reviews and 2) intervention studies. All were initially appraised under the following headings: study information; (author/year of publication); type of study (design); sample (size, diagnosis, and ages); the type of intervention; and results of the intervention (e.g., effective or not at decreasing RRB).

From the fourteen publications, only the original study or review paper that reported results of effective interventions to decrease RRBs is included in Table 2. Those interventions found to be ineffective or inconclusive (i.e., had no effect on RRB or had no more effect compared to treatment as usual) by the respective authors or by the authors of the reviews were not included. All of the interventions noted in the review by Boyd et al. (2012) were identified as effective in the reduction of RRBs. Only some of the interventions in the systematic review by Patterson, Smith & Jelen (2010) and some of the interventions in the individual intervention studies were found to be effective. In total twenty-eight different effective interventions were identified from eleven of the studies. Table 2 describes those studies in terms of intervention, intervention category, and PEO (Law et al., 1996). The intervention category uses a classification system (Boyd et al., 2012) with terms that are common within the field of ABA.

Table 1. Summary of Articles Included in the Integrative Review

Study Information	Type of study	Sample	Intervention	Results	
				Effectively or ineffectively decrease RRBs	
				Effective	Ineffective
I Reviews					
Boyd BA, Mcdonough SG, Bodfish JW 2012.	Review 1974- 2010	27 studies Dx: ASD with RRBs  Age: Does not specify	Response Interruption and Redirection /response blocking (Physically or verbally blocking from engaging in behaviour)	Ahearn et al. 2007.	
			Response cost procedures (Removal of a positive consequence when a repetitive behavior occurs)	Koegal et al. 1974	
			Differential reinforcement (Reinforce other behavior the individual displays)	Liu-Gitz L, Banda DR 2010.	
				Athens et al. 2008.	
				Sidener et al. 2005.	
				Azrin et al. 1988	

Table 1. Summary of Articles Included in the Integrative Review

Consequence based uses Circumscribed Interests (CI) (CI used as a contingent reinforcer delivered on the occurrence of appropriate behaviors)	Charlop-Christy M, Haymes L. 1996, 1998)
Differential reinforcement of variability (Reinforcing the individual for varying behavioral responses with the reinforcement being linked to how novel the behavior is)	Boyd et al. 2010 Miller, Neuringer 2000
Visual or verbal cues (Cues used to forewarn the child or allow engagement in calming or highly preferred task prior to difficult task)	Conroy et al. 2005, Horner et al. 1997

Table 1. Summary of Articles Included in the Integrative Review

<p>Environmental enrichment (Strategies: noncontingent access to appropriate competing sources of reinforcement)</p>	<p>Piazza et al. 2000 Rapp, Vollmer (2005) Vollmer et al. 1994.</p>
<p>Antecedent Based uses of Circumscribed interests (CI) (CI is embedded in the task the person will engage in to increase desired behavior during the activity)</p>	<p>Baker, 2000. Baker et al. 1998. Boyd et al 2007.</p>
<p>Visual schedules or video based technologies (used to tolerate change or expand repetitive behavior)</p>	<p>Hine, Wolery 2006 Odom et al. 2003.</p>
<p>Cognitive Behavior Therapy/Exposure Response Prevention (Cognitive reframing and exposure response prevention exercises)</p>	<p>Lehmkuhl et al. 2008**** Reaven, Hepburn 2003.</p>
<p>Functional Communications training</p>	<p>Kennedy et al. 2000.</p>

Table 1. Summary of Articles Included in the Integrative Review

18

			(teaching appropriate communication responses that can be used to obtain the same reinforcer)	
			Physical Exercise (participates prior to subsequent activity associated with repetitive behavior)	Kern et al. 1984.
Patterson SY, Smith V, Jelen M. 2010.	Systematic Review  10 single case studies  Studies up until June 2008	Size: 17 participants  Dx: ASD* Age 2y 11mo-26years	Response interruption and redirection (RIRD)  Differential reinforcement and extinction (reinforcement in the event of a correct response, and no reinforcement when there is not a correct response)	Ahearn et al. 2007  Rehfeldt, Chambers, 2003.  Scheduled thinning of response blocking
				Tarbox et al. 2002.

Table 1. Summary of Articles Included in the Integrative Review

Noncontingent Reinforcement and response blocking (the delivery of reinforcers according to a schedule that is not response contingent and blocking the response before it starts)	Carr et al. 2002.
Noncontingent Reinforcement and response interruption (RI) (the delivery of reinforcers according to a schedule that is not response contingent and interrupting the behavior as it is occurring)	Cicero 2007. (No more difference than RI alone)
Noncontingent access (Continuous access, access to items not dependent on behavior)	Roane et al. 2003.
Matched stimulation and noncontingent reinforcement (Access to items that produced similar sounds to the problematic	Rapp 2007.

Table 1. Summary of Articles Included in the Integrative Review

behavior, Access not contingent on behavior)

Noncontingent reinforcement and prompting procedures

(the delivery of reinforcers according to a schedule that is not response contingent and the adult prompting the child to perform an appropriate behavior)

Britton et al. 2002.

Functional communication training

(teaching appropriate communication responses that can be used to obtain the same reinforcer)

Kennedy et al.  
2000

Antecedent based visual cue card strategy

(Visual prompts provided before the behavior occurs)

Conroy et al. 2005.



Table 1. Summary of Articles Included in the Integrative Review

II Intervention Studies				
Boyd BA, McDonough SG, Rupp B, Khan F, Bodfish JW. 2011.	Multiple Single case design	Size: 5 Dx: ASD* Age: 48 months	Family-Implemented Treatment for Behavioral Inflexibility  12 week direct instruction to teach parents to identify environmental cues that elicited RRBs**, how to inhibit repetitive behaviors in the presence of these cues and replace them with alternative, adaptive behaviors	Decrease in repetitive behaviors
Boyd BA, Woodard CR, Bodfish JW. 2013.	Multiple single case design	Size: 5 Dx: ASD* and co-morbid intellectual disabilities Lived in a residential facility Age: School age (5-11)	Exposure response prevention (Exposure: repeated gradual exposure to environmental stimuli that are associated with anxiety and subsequent compulsive behavior)  AND Response prevention (active avoidance of the compulsive act)  10 sessions	Decreased lower order RBs ***  Most effective when there are tangible antecedent stimuli. that reliably predict the onset of RB***

Table 1. Summary of Articles Included in the Integrative Review

<p>Grahame V, Brett D, Dixon L, McConachie H, Lowry J, Rodgers J, Couteur A. 2015.</p>	<p>RCT Intervention vs delayed intervention</p>	<p>45 families Parents of children with ASD* Aged 3–7 years</p>	<p>Managing Repetitive Behaviors Program (Parent-group intervention: Psycho-educational intervention incorporates knowledge of ASD, the principles of a Functional analysis approach Combined with the mutual support of group peer learning)</p>	<p>Parent-reported changes in RRBs* vs delayed group</p>
<p>Kang S, O'Reilly M, Rojeski L, Blenden K, Xu Z, Davis T, Lancioni G. 2013.</p>	<p>Multiple single case design ABA design</p>	<p>Size: 3 Dx: ASD* Age: 3-8 years</p>	<p>Tangible reinforcer Compared to Social Reinforcement by others</p>	<p>When social praise used as the reinforcer</p>
<p>Kuhn DE, Hardesty SL,</p>	<p>Single Case study</p>	<p>Size: 1</p>	<p>Functional communication training with extinction of destructive behavior and response blocking of</p>	<p>Effective when all three approaches were used together</p>

Table 1. Summary of Articles Included in the Integrative Review

Sweeney NM, 2009.	ABAB Design	Dx: ASD* and moderate mental retardation Age: 16 years	repetitive straightening (physically or mechanically disrupting the response before its completion).	
Lehmkuhl HD, Storch EA, Bodfish JW, Geffken GR. 2008.	Single case study	Size; 1 Dx ASD* and Obsessive Compulsive Disorder (OCD) Age: 12-year-old male	Cognitive behavioral therapy with exposure and response prevention.	Cognitive behavioral therapy is effective in reducing OCD symptoms in a child with ASD
Loftin RL, Odom SL, Lantz JF 2008.	Multiple single case multiple baseline design	Size: 3 Dx: ASD* Age: 9,10,10	Multi-component social skills intervention (including peer training, social initiation instruction, and self-monitoring)	Participants' repetitive motor behavior was reduced.  Changes in social behavior and in repetitive motor

Table 1. Summary of Articles Included in the Integrative Review

				behavior maintained more than one month after the intervention ended
Love JJ, Miguel CF, Fernand J K, LaBrie JK. 2012.	Case study Quantitative And qualitative	Size: 2 Dx: ASD* Age: 9,10	Response interruption and redirection (RIRD)  Noncontingent access to matched stimulus (MS)  Response interruption and redirection AND Noncontingent access to matched stimulus	Client 1: Similar suppressive effects on vocal stereotypy across treatment conditions.  Client 2: Slightly greater suppression of stereotypy was associated with MS and RIRD together.
Murdock LC, Dantzler J A, Walker AN, Wood L B. 2014.	Randomized pretest–posttest control group design	Size:30 Dx: ASD* Median age was 52 months with a range of 30 to 77 months	Platform swing (used after and before participation in tasks)  Vs. watching a movie (non-sensory task)	No differences were evidenced between the treatment and control groups on engagement, on-task behavior,

Table 1. Summary of Articles Included in the Integrative Review

stereotyped/repetitive behavior, or out-of-seat behavior.

Rodriguez NM, Thompson RH, Stocco CS, Schlichenmeyer K. 2013.	Multiple single case ABA design	Size: 3 Dx: ASD* and demonstrating ordering and arranging that was problematic Age: 9-14 yrs.	Matched Item plus blocking  Matched Item plus prompts plus, blocking	Depending on the function of the behavior  RB*** decreased when the function of the behavior was determined and treatment was chosen based on the FBA
Storch EA, Arnold EB, Lewin AB, Nadeau J, Jones AM, De Nadai	2 group Treatment vs Treatment as Usual) RCT	Size: 45 Dx: ASD* High functioning And clinically significant anxiety	Cognitive Behavioral Therapy x 16 weeks Behavioral Interventions for Anxiety in children with ASD (Biaca)  Family based approach Child and Parents	ASD symptoms (stereotypic mannerisms) decreased as a secondary effect (not directly targeted)

Table 1. Summary of Articles Included in the Integrative Review

AS, Murphy TK. 2012.	Pre-post design	Age 7-11 years		I.e. As anxiety symptoms decreased so did Stereotypic mannerisms (RRB**)
Watling RL, Dietz J. 2007.	Single-subject study used an ABAB design	Size: 4 Dx: ASD* Age: 3-4.4 years	Ayres Sensory Integration Vs. play scenario	No difference between 2 groups on RRB***

---

Notes:

Dx = Diagnosis

\*(ASD) ASD Spectrum Disorder

\*\* (RRB) Restricted and Repetitive Behaviors

\*\*\* (RB) Restricted Behaviors

\*\*\*\* Studies are also listed in intervention studies

Table 2. Classification and analysis of effective RRB interventions that target person, environment or occupation

Study Information: Author (year of publication)	Intervention	Intervention Category (Boyd et al., 2012)	PEO*Level of Treatment (Law et al., 1996)
Treatment Approaches that Target the Environment			
Boyd BA, McDounough SG, Ruppy B, Khan F, Bodfish JW. 2011.	Family-Implemented Treatment for Behavioral Inflexibility (FITBI)	Antecedent: skills (parents)	Environment
Hine, Wolery. 2006. Odom et al. 2003 In: Boyd BA, Mcdonough SG, Bodfish JW. 2012.	Use of visual schedules or video based technologies (used to help prepare child to tolerate change or expand RB**)	Antecedent: modifying environment	Environment
Conroy et al. 2005 & Horner et al. 1997 In: Boyd, BA, Mcdonough, SG, Bodfish JW. 2012.	Visual or verbal cues (to forewarn the child or allow engagement in calming or highly preferred task prior to difficult task)	Antecedent: modifying environment	Environment

Table 2. Classification and analysis of effective RRB interventions that target person, environment or occupation

<p>Boyd et al. 2010 [17]                  Miller, Neuringer. 2000.                  In: Boyd BA, Mcdonough, SG,                  Bodfish, JW. 2012.</p>	<p>Differential reinforcement of variability                  (reinforcing the individual for varying                  behavioral responses with the reinforcement                  being linked to how novel the behavior is</p>	<p>Consequence</p>	<p>Environment</p>
<p>Azrin et al. 1988.                  In: Boyd BA, Mcdonough SG,                  Bodfish JW. 2012.</p>	<p>Differential reinforcement                  (Reinforce other behavior the individual                  displays)</p>	<p>Consequence</p>	<p>Environment</p>
<p>Athens et al. 2008                  Sidener et al. 2005                  In: Boyd BA, Mcdonough SG,                  Bodfish JW. 2012.</p>	<p>Response cost procedures: removal of a                  positive consequence when a repetitive                  behavior occurs</p>	<p>Consequence</p>	<p>Environment</p>
<p>Boyd BA, Woodard CR, Bodfish                  JW. 2013.</p>	<p>Exposure response prevention: ERP                  (Exposure: repeated gradual exposure to                  environmental stimuli that are associated with                  anxiety and subsequent compulsive behavior)                  (Response prevention: active avoidance of the                  compulsive act)</p>	<p>Antecedent: modify                  environment and consequence</p>	<p>Environment</p>



Table 2. Classification and analysis of effective RRB interventions that target person, environment or occupation

Grahame V, Brett D, Dixon L, McConachie H, Lowry J, Rodgers J, Couteur A. 2015.	Managing repetitive behaviors program with parent-group intervention	Antecedent: Skills (parents)	Environment
Kang S, O'Reilly M, Rojeski L, Blenden K, Xu Z, Davis T, Lancioni G. 2013.	Tangible reinforcer Compared to social reinforcement by others	Consequence	Environment
Rehfeldt RA, Chambers MR. 2003.  In: Patterson SY, Smith V, Jelen M. 2010.	Differential reinforcement and extinction (Reinforcement in the event of a correct response, and no reinforcement when there is not a correct response)	Consequence	Environment
<hr/> Treatment Approaches that Target the Person			
None	None	None	

---

Table 2. Classification and analysis of effective RRB interventions that target person, environment or occupation

Treatment Approaches that Target Occupation			
Kern et al. 1984 In: Boyd BA, Mcdonough SG, Bodfish JW. 2012.	Physical exercise (child participates prior to subsequent activity associated with RB**)	Antecedent modify environment (routine)	Occupation
Treatment Approaches that Target the Environment and Person			
Lehmkuhl et al. 2008. *** Reaven, Hepburn 2003. In: Boyd BA, Mcdonough SG, Bodfish JW. 2012.	Cognitive Behavior Therapy /Exposure Response Prevention  (Cognitive reframing and exposure response prevention exercises)	Antecedent: skill	Person
		Antecedent: modifying environment and consequence	Environment
Lehmkuhl HD, Storch EA, Bodfish JW, Geffken GR. 2008.	Cognitive behavioral therapy with exposure and response prevention.	Antecedent: skill	Person
		Antecedent: modify environment and consequence	Environment

Table 2. Classification and analysis of effective RRB interventions that target person, environment or occupation

Storch EA, Arnold EB, Lewin AB, Nadeau J, Jones AM, De Nadai AS, Murphy TK. (2012).	Cognitive Behavior Therapy x 16 weeks	Antecedent: skill	Environment (parent skills)
			Person (child skills)

---

Treatment Approaches that Target the Environment and the Occupation

Baker MJ. 2000 [24], Baker et al. 1998. In: Boyd BA, Mcdonough, SG, Bodfish JW. 2012.	Antecedent Based uses of circumscribed interests (CI) (CI is embedded in the task the person will engage in to increase desired behavior during the activity)	Antecedents: modifying environment	Environment and occupation
Piazza et al. 2000. Rapp, Vollmer. 2005. Vollmer et al. 1994. In: Boyd B A, Mcdonough SG, Bodfish JW. 2012.	Environmental enrichment strategies (noncontingent access to appropriate competing sources of reinforcement)	Antecedent: modifying environment	Environment and occupation

Table 2. Classification and analysis of effective RRB interventions that target person, environment or occupation

<p>Charlop-Christy M, Haymes L. 1996., 1998                  In: Boyd BA, Mcdonough, SG, Bodfish JW. 2012.</p>	<p>Consequence based uses Circumscribed Interests (CI)                  (CI used as a contingent reinforcer delivered on the occurrence of appropriate behaviors)</p>	<p>Consequence</p>	<p>Environment and occupation</p>
<p>Ahearn et al. 2007                  Koegal et al. 1974.                  Liu-Gitz L, Banda DR. 2010.                  In: Boyd BA, Mcdonough S.G. Bodfish JW. 2012.</p>	<p>Response Interruption and Redirection/response blocking (Physically or verbally blocking from engaging in behavior)</p>	<p>Consequence</p>	<p>Environment and occupation</p>
<p>Love JJ, Miguel C F, Fernand JK, LaBrie JK. 2012.</p>	<p>Response interruption and redirection (RIRD)</p>	<p>Consequence</p>	<p>Environment and occupation</p>
	<p>Noncontingent access to matched stimulation (MS)</p>	<p>Antecedent: modify environment</p>	<p>Environment and occupation</p>
	<p>RIRD and MS</p>	<p>Consequence and Antecedent: modify environment</p>	<p>Environment and occupation</p>

Table 2. Classification and analysis of effective RRB interventions that target person, environment or occupation

<p>Roane H S, Kelly ML, Fisher WW. 2003. In Patterson SY, Smith V, Jelen M. 2010.</p>	<p>Noncontingent access</p>	<p>Antecedent: modify environment</p>	<p>Environment and occupation</p>
<p>Ahearn WH, Clark KM, Macdonald RPF, Chung BI. 2007. In: Patterson SY, Smith V, Jelen M. 2010.</p>	<p>Response interruption and redirection</p>	<p>Consequence</p>	<p>Environment and occupation</p>
<p>Rapp JT. 2007. In Patterson SY, Smith V, Jelen M. 2010.</p>	<p>Matched stimulation and Noncontingent Reinforcement</p>	<p>Antecedent: modify environment and consequence</p>	<p>Occupation and environment</p>

Table 2. Classification and analysis of effective RRB interventions that target person, environment or occupation

Rodriquez NM, Thompson RH, Schlichenmeyer K.2013.	Matched Item plus, blocking	Antecedent: modify environment and consequence	Occupation and environment
	Matched Item plus prompts plus blocking	Antecedent: modify environment and consequence	Occupation and environment

---

Treatment Approaches that Target the Environment, Occupation and Person

Kennedy et al. 2000. Boyd BA, Mcdonough SG, Bodfish JW. 2012.	Functional communications training (teaching appropriate communication responses that can be used to obtain the same reinforcer)	Antecedent: skill and consequence	Person (speech) Environment Occupation (social interaction)
Kuhn DE, Hardesty SL, Sweeney NM. 2009.	Incorporated functional communication, with extinction of destructive behavior and response blocking of repetitive straightening	Antecedent: skill and consequence	Occupation (alternative replacement activity: social interaction)
		Antecedent: modifying environment	Environment (Mod)
			Person (skills: speech)

Table 2. Classification and analysis of effective RRB interventions that target person, environment or occupation

Loftin RL, Odom SL, Lantz J F. 2008.	Multi-component social skills intervention (including peer training, social initiation instruction, and self-monitoring)	Antecedent: skill and consequence	Occupation (social interaction)
			Environment (social)
			Person (social initiation and self-monitoring)

---

Notes:

\* PEO (Person Environment Occupation) Model of Occupational Performance

\*\* RB (Restricted Behavior)

## **2.5 Data Analysis**

### **2.5.1 Intervention Classification by ABA Framework.**

Analysis of the total twenty-eight effective interventions named using the ABA framework proposed by Boyd et al., (2012) led to nine interventions being considered within the consequence-based intervention category, ten fell within the antecedent-based intervention category (modifying the environment or routine to reduce the likelihood of the RRB occurring or enriching the skills of the individuals in the environment). The remaining nine interventions were found to fall under a combination of the consequence and antecedent categories.

### **2.5.2 Intervention Classification by PEO Model.**

PEO classification was determined by answering the question: Is the treatment aiming to impact the person, the environment or the occupation? This categorization was reviewed and agreed upon by all members of the research team. Of the twenty-eight effective interventions identified none were found to exclusively target the person, twelve targeted the environment only (enhancing the physical or social environment of the child), and one targeted only occupation. Many interventions targeted strategies at two or more aspects of the PEO model: two concurrently targeted the person and the environment, eleven targeted the environment and occupation and the remaining three interventions targeted all aspects of the PEO: person, environment and occupation.

A comparison of the identified effective behavioral interventions using both the ABA approach suggested by Boyd et al., (2012) and the PEO model (Law et al., 1996) can be seen in Table 3.



**Table 3. RRB Intervention Classification and Comparison between the ABA approach and the PEO Model of Occupational Performance**

		Functional Behavior Analysis Concepts			
		Antecedent based Interventions (Modifying environment or routine)	Antecedent Based Interventions (Enriching Skills)	Consequence Based Interventions	Consequence and Antecedent Based interventions
PEO Components					
Person	NA	NA	NA	NA	NA
Environment	Visual schedules or video based technologies	Family-implemented treatment for behavioral inflexibility	Differential reinforcement of variability	Response cost procedures	Exposure response Prevention
	Visual or verbal Cues	Managing Repetitive Behavior Program	Tangible reinforcers	Social praise	
			Differential reinforcement plus extinction		
			Differential Reinforcement		
Occupation	Physical exercise				

**Table 3. RRB Intervention Classification and Comparison between the ABA approach and the PEO Model of Occupational Performance**

PEO Component Interactions					
Person and Environment			Cognitive Behavioral Therapy (parents and child)		Cognitive behavioral therapy plus exposure response prevention
Person and Occupation	NA		NA	NA	NA
Occupation and Environment.	Antecedent based uses of circumscribed interests			Consequence based use of circumscribed interests	Response interruption redirection plus matched stimulus
	Environmental enrichment strategies			Response interruption and redirection/response blocking	Matched stimulation and noncontingent reinforcement
	Noncontingent access to matched stimuli			Response interruption and redirection	Matched item plus, blocking
	Noncontingent access				Matched item plus prompts plus blocking

**Table 3. RRB Intervention Classification and Comparison between the ABA approach and the PEO Model of Occupational Performance**

Occupation,  
Environment, and  
Person

Multi-component social skills  
intervention

Functional communication  
training  
(FCT) with reinforcement

Functional communication plus  
extinction of destructive  
behavior plus response blocking

---

## **2.6 Discussion**

This integrative review explored how occupational therapists can address RRBs by incorporating known evidence-based behavioral interventions into an occupational therapy frame of reference. Analysis of the twenty-eight effective interventions identified for the treatment of RRBs in ASD included in this review outlined similarities between the ABA approach suggested by Boyd et al. (2012) and the PEO model (Law et al., 1996). The simultaneous application of these two models demonstrate how the interventions relate to occupational therapy theory and practice and will help guide occupational therapists in choosing the best treatment approach to use with their clients. In addition, this analysis highlights for all members of interdisciplinary teams working with children with ASD, the unique perspective that occupational therapists have in understanding RRBs in relation to the person, the environment, and also the occupation and how these limitations can be addressed.

### **2.6.1 Interventions targeting the Environment.**

Occupational therapists often aim to impact occupational performance by changing the environment in which the occupation is performed. The ABA framework when used in combination with the PEO concepts allows the therapist to consider events in the environment in terms of antecedents and consequences of behaviors and the timing of these environmental adjustments or controls. Overall, the majority of interventions (twelve) were found by the authors of this review, to be primarily targeting the environment aspect of the PEO model. Interventions that were classified under environment included consequence based interventions, antecedent based (modifying the

environment or routine) interventions, as well as some antecedent based (enriching skills) interventions.

An example of an intervention that targeted change to the environment by changing or improving the skills of others in the child's world is the Family-Implemented Treatment for Behavioral Inflexibility (FITBI) (Boyd, McDonough, Rupp, Khan & Bodfish, 2011). A parent-group intervention in which the parents were trained and offered new skills in order to address their child's RRBs. This approach would be seen as changing the antecedent or what happens before the behavior occurs by enriching the skills of individuals in the child's environment and by doing so affecting the RRB.

Some interventions targeted the environment by modifying the physical surroundings in which the behavior was performed. Examples of such interventions include the use of visual schedules or video based technologies (Hine & Wolery 2006; Odom et al., 2003). Using the ABA framework, these strategies are examples of modifying the environment as an antecedent approach. Other interventions used the environment as a consequence strategy by changing the environment after the RRB occurred to either reinforce or deter the performance of the RRB. Finally, a few interventions altered the environment as both an antecedent and a consequence strategies. For example, exposure response prevention (Boyd, Woodard & Bodfish, 2013) involved setting up the environment with items that were associated with the RRBs before the behavior occurred (antecedent) then preventing or blocking the RRBs (consequence).

### **2.6.2 Interventions targeting the Person.**

In practice the occupational therapist may address the individual's skills, determine if they fit with the occupation, and possibly impact occupational performance. If the person's skills do not match the demands of the occupation and the environment where the task is being performed, intervention at the skill level of the person will need to be addressed. Of all the effective interventions identified in this study, none were found to target solely the person level of the PEO model exclusively.

### **2.6.3 Interventions targeting Occupation.**

Occupational therapists also influence changes at the level of the occupation as a way to impact occupational performance or behavior. "Occupations refer to the everyday activities that people do as individuals, in families and with communities to occupy time and bring meaning and purpose to life. Occupations include things people need to, want to and are expected to do" (WFOT, 2016) When considering the number of effective treatment options discovered in the literature, the occupational therapist must consider how "occupation" fits.

Occupation may be incorporated into intervention for RRBs as an antecedent event that will decrease the likelihood of a problematic behavior such as RRB occurring. Kern, Koegel, & Dunlap (1984) identified one intervention that used the occupation of physical exercise in this way. By exercising, the person is engaging in a functional occupation that may fulfill the same needs as the RRB. Possibly providing sensory or calming feedback that leads to a decreased level of arousal and therefore a decreased need to engage in RRBs. Exercise therefore eliminates the need for engagement in the RRB and serves as a replacement behavior for the nonfunctional RRB. The type of

antecedent occupation that is facilitated however will be dependent on the person and therefore must be chosen and/or adapted based on the needs and abilities of the person.

#### **2.6.4 Interventions targeting Person and Environment.**

A few interventions identified addressed both the person and the environment aspects of the PEO model. These interventions included antecedent (enrichment of skills) approaches, antecedent (modifying the environment) approaches, as well as consequence based approaches.

Cognitive behavior therapy (CBT) Reaven & Hepburn, (2003) targets the cognitive skills of the individual while also targeting change in the environment by using exposure and response prevention at the same time. Not only were cognitive reframing skills taught to the client, they were physically applied using strategies that involved access or denial of items in the environment that were related to the RRBs.

#### **2.6.5 Interventions targeting Occupation and Environment.**

Some interventions targeted occupation while also targeting the environment. An example includes matched item, plus blocks and prompting approach (Rodriguez, Thompson, Stocco & Schlichenmeyer, 2013). In this approach the performance of RRB is blocked and participation in use of the matched item is prompted. This intervention is both antecedent type (modifying the environment) and consequence type.

#### **2.6.6 Interventions targeting Occupation, Environment, and Person.**

Functional communication training (FCT) plus extinction (Kuhn, Hardesty & Sweeney, 2009) addresses person, occupation and environment. The person component is addressed as improving skills (speaking) and the occupation of social interaction is done

through modification of the task by providing prompts. The environment (modifying) is involved through the availability of items dependent upon whether RRB are occurring or not. Treatments are considered to be antecedent (enhancing skills of client or others in the child's environment) and consequence based (access or denial of reinforcers).

### **2.6.7 Occupational therapy and Occupation as part of Intervention for RRB.**

Since occupational therapists aim to make change in occupational performance or behavior by influencing change in any or all aspects of the PEO Model, interventions that target change under any of these categories are within the occupational therapy scope of practice.

Occupation has been incorporated into RRB interventions through the use of the alternative replacement behavior - typically recommended as part of an Functional Behavior Assessment (FBA). The alternative replacement behavior is considered the functional equivalent to the identified problematic behavior (Carr & Durand, 1985). The alternative replacement behavior is a new behavior, chosen by the therapist that is more appropriate or more functional than the problematic behavior. To occupational therapists, this alternative replacement behavior may be seen as the modified occupation; the occupation is changed in such a way that it will enable successful occupational performance. The alternative replacement behavior is maintained by the same consequence that maintained the problematic behavior or RRB. In other words, it provides the same reinforcement that the problematic behavior provided. The function of RRBs for individuals with ASD has frequently been determined to be a need for unique sensory input (Iwata & Others, 1994). Boyd et al., (2012) discuss how this can sometimes complicate the development of interventions that target repetitive behavior since



understanding what the child actually gains or escapes by engaging in the sensory behavior can be difficult. In relation to treatment for RRBs, Patterson, Smith & Jelen (2010) suggest “The clinical expertise of occupational therapists who work with individuals ASD may prove to be a valuable resource in the decision making process” (p. 325) for this reason.

Occupational therapists are trained in the assessment of occupational performance by understanding occupation or task requirements, the influences of the environment (physical, social, sensory as antecedents and consequences) and the skills of the person (cognitive, perceptual, physical, sensory) and then determining how those components match or fit together. If there is not a good fit resulting in occupational dysfunction, the occupational therapist may modify the environment, the occupation, or enhance the individual’s skills as part of treatment in order to achieve optimal occupational performance. Occupational therapists may therefore be uniquely qualified in determining the maintaining consequences of a problematic behavior and also in recommending appropriate alternative replacement behaviors/occupations that would result in the same consequences as the RRB, particularly those that seem to be related to a sensory need.

#### **2.6.8 Limitations.**

It is possible that all known evidenced based interventions identified to effectively address RRBs were not identified as a result of the search completed for this review based upon the search terms utilized.

The classification of the evidenced based interventions identified according to the PEO Model was based on the opinion and analysis of the author group. Other therapists or professionals may view the intervention categorization differently. The same is true for

the classification of identified interventions according to the ABA framework. Many were classified previously by the author Boyd et al., (2012) however the remaining interventions that were not part of that study were classified based on the opinion of the author of the present study as well. Nonetheless, the similarities between how the two frameworks align could be useful to the occupational therapist in determining the intervention approach for their respective client needs.

The current analysis is not specific in terms of RRBs type and the corresponding effective evidenced based intervention(s) (e.g., effective interventions for the RRB of spinning repetitively). In addition, effective interventions for RRBs for individuals with and without intellectual disabilities were not addressed separately. Further delineation of interventions for specific RRB, together with addressing the potential for the interaction with the level of intellectual ability is warranted.

## **2.7 Conclusion**

Occupational therapists have an important role to play in the treatment of RRBs seen in individuals diagnosed with ASD. As members of interdisciplinary teams working with this population, occupational therapists can enable improved engagement and performance in meaningful occupations in part by decreasing RRBs and teaching new skills. This can be achieved in many ways by targeting various or multiple aspects of the PEO model which map well onto the list of interventions identified in this review. This review provides a framework for occupational therapists to understand and utilize behavioral interventions in the context of occupational performance. This new information will also inform other professionals of the potential role the occupational therapists may have with this population

## **CHAPTER 3 METHODOLOGY**

### **3.1 Rationale**

The goal of occupational therapy is to help clients overcome functional limitations in order to achieve greater independence and success in tasks (WFOT, 2011). For children with ASD, Restricted and Repetitive Behavior (RRB) is a core problematic issue and since RRBs have the potential to limit functional performance in expected tasks, addressing RRBs fits within the scope of practice of an occupational therapist.

The integrative review by Patriquin et al. (2017) included in Chapter 2, identified evidenced based interventions to address RRBs with children diagnosed with ASD and outlined how those interventions can potentially fit within an occupational therapist's scope of practice by mapping them onto the PEO Model of Occupational Performance.

As a follow-up to this review the present study aimed to determine if Canadian occupational therapists are currently addressing RRBs in practice, the clinical reasoning they used when deciding on interventions and how they aligned with the evidenced based interventions identified.

### **3.2 Research Design**

This qualitative research incorporated a key informant interview design involving the use of a semi structured, open ended interview format. A semi structured interview allowed the researcher to gain in depth information regarding the intervention approaches being used to address this issue and the therapist's clinical reasoning for choosing that approach (Bernard, 1988).

Key informants targeted for the study included occupational therapists from across Canada who have expertise working with children diagnosed with ASD.

### **3.3 Research Questions**

How are Canadian occupational therapists addressing the functional limitations resulting from restricted and repetitive behaviors experienced by children diagnosed with ASD (ages 0-18)?

- Are Canadian Occupational Therapists addressing RRB with children diagnosed with ASD? Do they feel this is something an occupational therapist may address in practice?
- What interventions/approaches are occupational therapists using to address RRBs?
- Are the interventions being used to address this issue evidence based?
- How do evidence based practices fit within the scope of occupational therapy?

### **3.4 Recruitment and Sampling**

Initially the plans for recruitment included key informants who were occupational therapists that are members of a Canadian special interest group. The members of this special interest group are occupational therapists who have demonstrated particular interest in and have the experience of working with this population by choosing to be members of this group. Many of these members have had additional training in this area of practice beyond their occupational therapy formal training. Also, since this group consisted of occupational therapists from across Canada, this researcher felt recruiting members would potentially result in a varied national representation. It was therefore anticipated that this sample could include 10 possible participants, the number of provinces in Canada. It was a known possibility that not all members of this committee

would wish to participate in the study and therefore the range of the number of participants was predicted to be between six -10. This study was successfully reviewed by Dalhousie University's Human Research Ethics Board (REB # 2016-3932).

Recruitment began with the lead researcher contacting the chair of this national committee by email (Appendix A) to discuss the study and the possibility of bringing it forward to the group as a potential research opportunity. After initial permission from the committee chair was obtained, members of the group were invited to participate by email. At that time the study information letter was sent (Appendix B). It described the purpose of the study and how information related to the topic was to be gathered in the form of a semi structured interview, consisting of 6-10 questions on this topic. It let the potential participants know that the interview would be conducted over the phone at a time convenient for the consenting participant and will take no more than 1 hour. The lead researcher's email address was included as part of the study information letter and potential participants were instructed that if interested in the study or finding out more they should indicate this by emailing the lead researcher.

These recruitments strategies resulted in 3 committee members interested in participation. At this time an amendment to the initial ethics proposal was submitted to pursue additional recruitment strategies in hopes to increase the sample size. As an additional recruitment strategy, the lead researcher employed a snowball sampling method (Marshall, 1996) by asking participants if there were any colleagues they knew that would meet the inclusion criteria and who may be interested in study participation. One additional participant was recruited in this way and was sent the study information letter. In addition, therapists known by the lead researcher to meet inclusion criteria were

invited to participate and sent the study information letter as well. Three additional participants were recruited in this way. In total seven Canadian occupational therapists were recruited for the study.

### **3.5 Participant Informed Consent**

Upon indicating interest in participation, the lead researcher forwarded the informed consent form (Appendix C) and the interview questions (Appendix D) to each potential participant to review. At the time of the interview the lead researcher also reviewed the consent form verbally (Appendix E) with each interested participant and documented their consent before commencing discussion.

This consent form explained that participation in this study was voluntary and there would be an opportunity to withdraw from the study for a given amount of time following the interview, maximum 2 weeks. If participants did wish to withdraw they were informed that they could do so by writing the lead researcher at the same email initial contact was made.

### **3.6 Methods and Analysis**

Individual interviews were arranged with each therapist who had indicated interest by emailing the lead researcher. Each therapist interviewed was assigned a number code to protect their identity. The questions asked during the interview were predetermined and provided to the participant in advance.

To begin the interview demographic information of each participant was collected including: years of practice and how often (percentage of caseload) they see children diagnosed with ASD between the ages of 0-18, years of practice working with this

population, and where each participant worked. This information was used to help describe the sample.

If the participant gave consent, the interview was audio recorded. If they did not give consent to record, the lead researcher recorded responses by pen and paper in the form of memos. In total four interviews were audio recorded and three interviews were not.

To enhance the trustworthiness of the study, quotes or summarized passages that were recorded with the intent of use in the written study were summarized and sent back to the respective participant as a form of member checking (Birt et al., 2016) to ensure accuracy. Participants were given a week to confirm or object to the information that had been summarized.

Following all interviews data gathered was color coded according to each interviewee and then grouped into a chart format according to questions asked by the lead researcher. All charted data was then reviewed for clarity by the other two researchers to ensure clarity and rigor (Tomlin & Borgetto, 2011).

Thematic (Braun & Clarke, 2006; Thomas, 2006) and content analysis (Elo & Kyngas, 2008) of data collected was then completed. Thematic analysis included consideration of all information shared and looking for similarities and repetitive responses among participants. Content analysis included mapping interventions reported by therapists interviewed onto the PEO (Person Environment Occupation) Model of Occupational Performance (Law et al., 1996). Each approach was also mapped onto an ABA framework and then compared to the evidence based practices identified through literature review.

### **3.7 Risk and Benefit Analysis**

The potential risks for participants associated with this study were low but were acknowledged in the ethics proposal and the study information letter to include the following: The risk of being identified, the risk of participants experiencing discomfort secondary to sharing and feeling judged for the treatment strategies they have been using in their practice, and also the potential risk of job/registration related consequences if the interventions they report as using/or have used are perceived as harmful or unethical.

Risk related to being identified was mitigated by assigning identifier codes for each participant and only using that code on transcribed data that was analyzed by members of the research team. All personal demographic information provided by participants which included initials, contact information such as phone number and email was only known to the lead researcher. This information was not shared. This information collected was only seen and stored in a secure location that no other person has access to other than the lead researcher. No names or other identifying information was used when reporting data in the publication. Also, all interviews were conducted individually by phone so that no participants were aware of other participants and the information they shared.

The risk of discomfort was addressed by ensuring that non-judgmental, informal language was used throughout the interview process. All questions that were part of the semi structured interview were made available to participants ahead of time and were phrased in such a way that participants so they would not feel judged or critiqued for the methods or interventions they reported as utilizing.



Participants were reminded at the beginning of the interview of their right to only answer questions they wanted to answer and that they had the right to end the interview at any time if they wished to do so. They were also reminded that the information being gathered was to be used for research purposes and to achieve an understanding of the interventions being used by occupational therapists in the field to address this functional limitation and that it was not going to be used for any work related performance issues.

The third potential risk identified was related to job/registration consequences. The researcher had a duty to report any unsafe or unethical practices that may put clients at risk. The participants were made aware of the researcher's duty to report as part of the study information letter and letter of consent. The duty to disclose is an extreme circumstance in which a therapist is not providing appropriate care to the client. Since interventions reported by therapists are those that they have used personally in their practice, that would have been approved by the therapist's employer, licensing board, as well as the parents/caregivers of the children receiving the intervention it was felt this would be a very unlikely situation and therefore not be putting participants at any greater risk for being reported had they not participated in the study. There is no known benefit to the individuals who volunteered to participate in this study.

### **3.8 Privacy and Confidentiality**

Privacy and confidentiality of participants and the information they share was ensured by assigning each individual a code. This list of participants, their demographic information, and assigned codes was only known by the lead researcher. Participant names were listed on the consent forms and were only seen by the lead researcher. These forms were stored in the lead researcher's locked desk at work until they were email

scanned and stored electronically onto the lead researcher's personal computer. The paper copy of these forms was destroyed at that time. These forms will remain in this location up until the publication of the study and for 5 years following. The data stored electronically on the lead researcher's personal computer was protected with a security code. After completion of the study this information will be destroyed. To ensure anonymity of participants the details related to the national group from which some were recruited was not named.

Audio data was originally recorded on the lead researcher's personal phone that is password protected. Audio recordings were kept on this personal phone until transcribed and then erased from the phone at that time.

Data generated that was recorded on paper when consent to audio record was declined was stored in the lead researcher's locked desk. This desk had only one key, which was kept on the researcher at all times. The desk is located in an office occupied only by the lead researcher and was locked whenever the lead researcher was not there. The original paper documents from interviews will be kept until the completion of the study and then destroyed. Any quotes used in the final written document only identified the source as "participant".

An exception to confidentiality that was outlined in the study information letter to all participants was the duty to disclose abuse and neglect.

### **3.9 Roles and Duties of the Research Team**

Thesis committee members provided guidance and recommendations in regards to the study methods, analysis, and discussion based on experience with research and occupational therapy intervention with children. An additional thesis committee member

had professional expertise working with children with ASD and the use of evidenced based interventions to address behavioral issues experienced by this population including RRB. Committee members had access to the data gathered but did not have access to any identifying information for the participants.

## **CHAPTER 4 DESCRIPTIVE INTERVIEW STUDY**

The following chapter is prepared as a manuscript that will be submitted for publication. This chapter was primarily written by Melissa Patriquin with contribution from Dr. Diane MacKenzie and Dr. Joan Versnel.

### **4.1 Abstract**

Restricted and Repetitive Behavior (RRB) often impedes functional behavior in individuals with ASD. Occupational therapists may need to address RRBs with this population in order to facilitate the client's functional goals. This qualitative study used semi-structured interviews to explore the range of RRB interventions and the clinical reasoning used by seven experienced Canadian occupational therapists related to this issue when working with children with ASD ages 0-18. Reported interventions were compared to evidenced based interventions identified as effective for RRBs by mapping onto the PEO (Person, Environment, Occupation) model of occupational performance and ABA (applied behavior analysis) frameworks. Overall, content analysis revealed 24 interventions reported by therapists interviewed to address RRBs in ASD. In addition, four core themes emerged related to occupational therapy practice and intervention, RRBs, and ASD: 1) Scope of Practice Boundaries; 2) Not only motoric RRBs; 3) Combining Frames of Reference for sound clinical reasoning; 4) Gaps in Education and Preparation.

### **4.2 Introduction**

Restricted and Repetitive Behavior (RRB) is a significant problematic issue experienced by some individuals diagnosed with ASD that often impedes functional behavior (Lam & Aman, 2007). RRBs may include stereotypical or repetitive motor

movements, repetitive speech, sounds or use of objects, insistence on sameness, highly restricted interests, as well as hyper or hypo reactivity to sensory input or unusual interest in sensory aspects of the environment (American Psychological Association [APA], 2013). RRBs may cause an individual to stand out by making them look and or act differently, potentially affecting social interactions, personal relationships, and possibly leading to social stigmatism and social isolation (Love et al., 2012). Rather than participating in or choosing to perform tasks considered functional or appropriate that are typically expected of their age, children with ASD often participate in RRBs instead. By performing the seemingly non-purposeful behaviors repeatedly, these individuals are often prevented from engaging in or do not have the opportunity to learn functional behaviors or acquire skills needed for expected or novel tasks.

Occupations can be those activities considered necessary for daily living or tasks that are important to the person themselves (World Federation of Occupational Therapists [WFOT], 2012). The goal of occupational therapy is to help clients overcome functional limitations in order to achieve greater independence and success in tasks (WFOT, 2012); therefore, addressing the RRBs experienced by those with ASD may often be part of an occupational therapist's treatment plan with this population.

Although RRBs can limit occupations as described above, it is worth considering the possible function of RRBs for individuals with ASD. Berjerot (2007) explained that although perhaps RRBs are something the individual feels compelled to perform they often also appear to be enjoyable to the individual performing them (Berjerot, 2007). Perhaps they help to enable occupational performance by decreasing level of arousal or stress. The occupational therapist might therefore consider the differing perspectives of

RRB, one as an activity that can interfere with functional engagement in age expected occupations but also as a means to decrease stress and therefore enable occupational performance. This consideration is important so the appropriate intervention to enable occupational well-being with this population can be determined (Patriquin, MacKenzie & Versnel, 2017).

Many theories related to the cause of RRBs in ASD exist, resulting in a variety of intervention options available to clinicians. Essential for all health care professionals including occupational therapists, is the selection and utilization of interventions that are based in evidence to ensure optimal outcomes for clients. In an integrative review by Patriquin et al. (2017), evidenced based interventions for RRBs, experienced by individuals with ASD were identified. These interventions were categorized according to an Antecedent, Behavior, and Consequence (ABC) framework outlined by Boyd, McDonough, & Bodfish (2012) that aligns with Functional Behavioral Assessment. Identified interventions were then cross referenced and categorized according to the PEO Model of occupational performance (Law, 1996), to demonstrate how these evidenced based interventions could relate to occupational therapy practice.

This comparative approach of the twenty-eight evidenced based interventions identified in the integrative review (Patriquin et al., 2017) revealed minimal interventions that would fit under the Person and Occupation aspects of the PEO and a majority of interventions that fell under the Environment aspect of the PEO. The remaining evidenced based interventions were found to target multiple aspects of the PEO model.

The literature review revealed a variety of treatment possibilities for occupational therapists to use to enable their clients experiencing RRBs to achieve improved

occupational performance in functional tasks, in part by decreasing RRBs. This review provided a framework for occupational therapists to consider and utilize behavioral interventions in the context of occupational performance.

The integrative review also revealed some remaining gaps in the research related to RRBs and occupational therapy. These gaps include knowledge about if and how occupational therapists are addressing RRBs in practice. In addition, it would be interesting to know if occupational therapists are using similar or related approaches as those interventions identified in the integrative review. The purpose of this study is to identify the range of interventions and the associated clinical reasoning Canadian occupational therapists are using to address RRBs and functional limitations with children diagnosed with ASD, ages 0-18. Doing so will further inform occupational therapy practice with this population.

### **4.3 Methods**

#### **4.3.1 Study design.**

A qualitative approach, utilizing a key informant interview design (Tremblay, 1957) was employed for this study. A semi-structured, open-ended interview format (Bernard, 1988) was used to gain in depth information regarding the intervention approaches being used to address RRBs together with the therapist's clinical reasoning. This study was reviewed and approved by the Dalhousie University Research Ethics Board (2016-3932).

#### **4.3.2 Recruitment.**

Purposive sampling/criterion sampling of participants was used to ensure individuals with certain criteria were included in the research (Palys, 2008). The targeted

study population for recruitment consisted of Canadian occupational therapists with membership in a national ASD special interest group. Members are known to have practice expertise and experience working with children with ASD many of whom exhibit RRBs. Typically, members may also have additional training specific to this area of practice beyond their entry-level occupational therapy training. Additionally, occupational therapists known by the lead researcher as well as therapists who were referred by other participants who met the inclusion criteria were purposively invited to participate. The inclusion criteria required participants be Canadian occupational therapists who have worked with children diagnosed with ASD demonstrating RRBs within the past 5 years.

#### **4.3.3 Participants and Data Collection.**

Recruitment resulted in seven female occupational therapists who met the criteria for participation and agreed to be part of the study. Therapists interviewed were from 3 different provinces in Canada. All therapists interviewed had at least 10 years' experience (range 10 to 36) working with children diagnosed with ASD who exhibit RRB. About half the participants worked in private practice (n=3) while the others (n=4) worked as part of the formal health care system.

Before starting the interview, participants were asked if they consented to having the interview recorded or not. Individual interviews were conducted over the telephone and required no more than 1 hr to complete. Interviews were audio recorded only when consent to do so was given. The lead researcher took memos during all interviews and transcribed all additional responses that had been recorded. In total four interviews were audio recorded and three were not. Data gathered was organized into a chart format



according to 8 questions asked. Memos generated from interviews that were not recorded were also organized for analysis in the same format.

To ensure trustworthiness transcribed and charted data was reviewed for clarity by the lead researcher and checked by a second researcher to enhance rigour (Tomlin & Borgetto, 2011). Selected quotes and context planned for use within the written report were sent to respective participants as a form of member checking to ensure accuracy (Birt et al. 2016). Each participant was given two weeks to withdraw or change their information that had been summarized.

#### **4.3.4 Analysis.**

Thematic analysis (Braun & Clarke, 2006; Thomas, 2006) and content analysis (Elo & Kyngas, 2008) were used to analyze the transcribed interview data and memos.

For thematic analysis, data collected from each interview was reviewed line by line. Key phrases, responses, and remarks were highlighted. Similar comments were then grouped together to detect patterns and relationships among categories. Themes were identified and interpreted in consultation with a second team member who also reviewed the findings for accuracy and completeness.

Content analysis was completed by categorizing interventions reported by therapists using the PEO (Person Environment Occupation) Model of Occupational Performance (Law et al.1996). The PEO Model guides occupational therapy practice by describing the relationships and interactions between the person, the environment, and occupation. The PEO model suggests that the three components interact to determine an individual's occupational performance. The initial coding structure for the content analysis in terms of what intervention would be grouped under what aspect of the PEO

Model, was developed by the primary author and reviewed by the other authors to assess the structure's comprehensiveness and accuracy in representing the data through the lens of established practice frameworks.

The primary investigator classified interventions reported as addressing the person aspect of the PEO if it involved improving the skills or abilities of the individual. An intervention was categorised under environment if the intervention involved changing a physical aspect of the environment or the skills of other individuals in the child's environment. An intervention was classified under the occupation aspect of the PEO model if the intervention involved replacing the RRB with an alternative occupation or activity.

Next the reported interventions were categorized according to an ABA (Applied Behavioral Analysis) framework. ABA is a field of applied study that is related to the understanding of behavior and learning (Baer, Wolf & Risley 1968). The ABA approach describes behavioral interventions that are related to the timing in which the intervention is applied and are described as being either as an antecedent approach, a consequence approach, or both. Within the ABA framework interventions were classified as an antecedent approach if it occurred before the RRB was performed (preventatively) and classified as a consequence approach if it was applied after the RRB occurred to either reinforce or deter.

Mapping the interventions reported using through the lens of PEO and ABA simultaneously allowed the primary investigator to understand the relationship between an occupational therapy practice model and a behavioral ABA frame of reference.

## **4.4 Results**

### **4.4.1 Thematic analysis.**

The data collected revealed information about the clinical reasoning used by the occupational therapists interviewed to address RRBs in practice. Four core themes were identified related to their occupational therapy practice intervention for RRBs and ASD.

#### *4.4.1.1 Scope of Practice Boundaries*

All therapists interviewed stated that addressing RRBs in practice is something they do and should do if they are interfering with an individual's function. Multiple participants described how RRBs impact function in relation to social interactions by making individuals look different resulting in differential treatment by others. Multiple therapists also described how RRBs can limit functional performance in the occupations of play or work since they take up so much time of the person with ASD, therefore limiting time spent on more functional occupations of play and work.

Some therapists stated that they believed if the RRB was not harmful (to self or others) then it wasn't impeding functional performance. One therapist commented that perhaps the RRBs may even be enabling more functional performance for some individuals rather than impeding them by providing ways to help decrease anxiety and regulating the individual's level of arousal. An additional reason given by therapists for addressing RRBs in practice included when it was identified as a concern by the family.

#### *4.4.1.2 Not only motoric RRBs.*

A majority of therapists reported that they tended to address motoric RRBs more often than repetitive thoughts or interests. Examples of motoric RRBs often addressed in practice included hand flapping, jumping, and rocking. Chewing, vocal stims, self-stim,

flicking fingers, spinning wheels on a car, biting, head banging, hitting own head, lining up cars, swinging or moving string in front of their face. One therapist suggested that perhaps these types of RRBs are addressed more often in practice because they are more noticeable or observably interfering with function compared to cognitive RRBs.

Another therapist reported that she tended to address cognitive RRBs more often in practice. She identified rigidity in behavior as one of these cognitive types of RRBs describing this behavior as “a need to always do things in the same way”. This therapist reasoned that she tended to address motoric RRBs less often stating:

*“We don’t really know what to do with these behaviors as the evidence is not strong to support a specific intervention for these types of behaviors when we have identified them as having a sensory based function.”* She also stated *“It is also very hard to stop these types of behaviors because they have automatic access to their body and it is fulfilling some kind of need.”*

In these situations when motoric RRBs are raised as issues this therapist reports that she often has a conversation with parents about if and how these behaviors may be interfering with function. If they are not, there may be no need or point in addressing them. She believes in some cases it may be best to just accept that they are going to perform this behavior. If this is still something the parents wish to be addressed she has often worked on teaching the child about “*time and place*” strategies for such behaviors.

Types of cognitive repetitive behaviors described by other therapists as addressed in practice included repetitive thoughts or obsessions. One therapist described these as “*rock brain*” thoughts. For example,

*“...being stuck on certain foods (color, texture, shape).”* She also identified *“rigid thoughts that resulted in strange or inaccurate conclusions.”* This involved *“making associations with things that seemed logical but were misguided.”* An example given included *“a fear of eating yogurt with a spoon.”*

The therapist reported that this child knew both spoons and knives were made of metal. This child also knew knives were sharp and dangerous therefore he thought spoons were dangerous and not safe to eat with because both objects were made of metal.

A few therapists were reluctant to differentiate between motoric types of repetitive behaviors and cognitive types. These therapists believed many RRBs have cognitive and motoric aspects. One example provided by a therapist interviewed was described as repetitive finger play which appeared to be primarily motoric initially, however this therapist described that in the end this may have been more about a repetitive thought as he seemed to be recreating playing a video game (his fingers were moving as if they were playing a video game).

In summary all therapists interviewed believed occupational therapists have a role to play in addressing RRB when that RRB impedes engagement in functional or meaningful occupations. This is true regardless of the nature of the RRB (i.e. cognitive or motoric).

#### ***4.4.1.3 Combining Frames of Reference for sound clinical reasoning***

Some specific intervention approaches named by therapists interviewed included:

(a) The Floor time Model; (b) Sensory integration; (c) Therapeutic Listening; (d) Self-

Regulation; (e) Social thinking; (f) Parent education; (g) Environmental modifications; (h) Functional Behavioral Assessment (FBA) with Positive Behavior Support (PBS).

Some of these interventions may be considered to be based on behavioral principles (Floortime, ABA/ PBS, social thinking) while others are clearly based on a sensory frame of reference (Sensory Integration, Therapeutic Listening). Others seem to have sensory and behavioral foci (i.e. teaching self-regulation, parent education, and environmental modifications).

Some therapists interviewed stated that they believed only in using a behavioral approach when addressing these behaviors while a few others reported they typically tend to use only a sensory approach. A majority of therapists reported that they commonly approach intervention of RRBs using both a behavioral and a sensory perspective simultaneously. One therapist said she believed:

*“It is important to integrate behavioral and sensory views”. To address RRBs one must understand the function of that behavior and sometimes the function of the behavior is seeking sensory input (to feel something) or avoiding it.”*

One therapist gave an example of trying to understand and provide intervention to address the RRB of a child dangling string in front of their face. The RRB was occurring so often it was limiting work being done at school.

*“Initially the behavior appeared to be sensory in that it was providing visual sensory stimuli that was interesting to that child.”* The therapist also postulated that *“the behavior may have helped the child to focus on one visual thing while blocking out other sensory stimuli that may have been overwhelming.”*

The therapist's intervention involved initially modifying the environment (limiting other sensory stimuli). A sensory diet was also implemented that planned certain sensory activities at certain times that helped the child calm down and achieve a more optimal level of arousal. This was not enough however because the dangling had become a habit and removing or blocking that behavior completely led to increased level of arousal (setting event). As a result, a "time and place" behavioral strategy was implemented as well. Using this approach, the child was able to continue dangling at certain times and in certain places however it was not allowed all the time as it was limiting his occupational performance at school. Eventually, the amount of time the child was dangling decreased. This was achieved as he learned other skills to cope with the sensory input that was overwhelming him. Doing so enabled him the opportunity to perform work occupations at school.

A similar behavioral/sensory approach was described by other therapists who had addressed the RRB of hand flapping. Multiple therapists interviewed explained that if they found that the RRB seemed to be driven by a sensory need their intervention would include an alternative replacement behavior (behavioral approach) that provided the same sensory input (sensory framework) but something that was perhaps more socially acceptable or more functional. For example, a replacement behavior for hand flapping, since it appears to be proprioception input that the child is receiving as a result of engagement in the RRB, could be clapping. For children repetitively spinning the wheels of a car, an alternative replacement behavior reported was redirecting them to perform crashing the car instead. She reported that implementing an appropriate time and place strategy simultaneously (behavioral approach) was needed to decrease this RRB.

The majority of therapists interviewed (n=6) stated that clinical reasoning about what interventions should look like would begin with a behavioral approach to determine what was the motivation for the RRB. Many of the therapists reported that it wouldn't matter if the RRB was motoric or cognitive, clinical reasoning (trying to figure out the reason for the behavior) would begin by trying to understand what the child is achieving from engaging in this behavior.

One therapist commented that "it is important to consider the whole picture when trying to understand RRB". What does the environment look like when the behavior is being performed (physically, socially, and sensory)? When is the behavior occurring (time of day and what happened just before the behavior occurred)? Also, what is the state of the child at the time (how do they seem to be feeling or acting) both emotionally and in terms of their level of arousal (hyper or hypo stimulated from a sensory perspective)? What occupation is the child engaged in at the time or what occupation are they being asked to do? Many therapists specifically expressed using a Functional Behavioral Assessment (FBA) approach to determine these variables.

One therapist stated that:

*"Intervention planned, following this type of analysis was very individualized to the child". In addition, "Two children may demonstrate exactly the same RRB but their intervention could look very different depending on what was revealed through the functional assessment".*

Therapists interviewed stated that "the intervention would be dependent on the data collected". One therapist reflected that "often people will assume a behavior is sensory driven when it is not". She reported that "often the behavior is occurring because



the child does not know what else to do” given there is a lack of skill or lack of occupation underlying the engagement in the problematic behavior. The intervention in this case would typically entail teaching new skills and new occupations that are functional. The therapist further explained,

*“There are often other reasons or motivations for performing RRBs, aside from a sensory need. “Sometimes an RRB that looks like a sensory behavior is occurring as a way to avoid a demand or a denial of something they want. The behavior may enable the child to escape a situation or to gain attention”.*

In this scenario, the therapist reported that *“most often intervention would mean teaching the new skill or occupation to replace the RRB but allow them to achieve the same consequence as the RRB”.*

Some other therapists described additional behavioral strategies often implemented with RRBs to include “FIRST/THEN” approaches. With these two intervention strategies, RRBs were used as motivators with limits. For example, the therapist may say to the child: FIRST you must do \_\_\_\_\_ (another behavior/occupation, not the RRB) and THEN you can \_\_\_\_\_ (perform the RRB).

An extinction behavioral approach was described by another therapist stating that they (as the clinician) may not acknowledge or choose to ignore the RRB in the hope it would decrease (if the consequence of the behavior was attention). Redirection to an alternative activity was also reported to be used along with this strategy.

#### ***4.4.1.4 Gaps in Education and Preparation***

All occupational therapists interviewed expressed they did not have enough information related to how best to approach these dysfunctional behaviors. They reported that initially they look to their peers and colleagues for advice about how to approach RRBs in practice. This would often include other OTs with more experience and looking to colleagues including psychologists and/or behavior consultants/interventionists for advice.

Many of the therapists interviewed reported key online and printed texts that they found helpful in guiding their practice. The majority of therapists report turning to evidenced based research related to RRBs and ASD but feel there is not much specific information about the OT role in relation to RRBs. All therapists interviewed reported that they did not feel they had received enough training while getting their occupational therapy degrees in relation to how to address RRBs in ASD.

The majority report a need for a better understanding of behavioral approaches related to how to address RRBs with this population using an occupational therapy lens. Close to half of therapists interviewed (n=3) feel strongly that a behavioral approach is the best, most evidence-based approach to address these issues and that what they have learned about a behavioral framework was accomplished through independent learning after finishing their occupational therapy education.

In addition, two of the therapists reported that they feel new grads are not getting enough education related to sensory processing. One therapist reported

*“I am frustrated that sensory integration is now a dirty word within the OT community”.*

She continued to explain that this is important because the expectation in the larger community where we work is that OTs know and understand sensory processing better than anyone else. Another therapist described the pressure she feels to understand and explain issues using a sensory perspective because of the way referrals are written, the opinions of parents, and other team members.

One therapist stated that *“To ignore sensory is a problem, particularly in relation to RRBs.”* She felt both sensory and behavioral understanding of RRB is needed to truly provide adequate intervention for this functional impairment. She added

*“OTs are lacking in our behavioral and our sensory knowledge. There is a lack of education around the needs of this population”* and that *“OT’s need to gain a better understanding of both behavior and sensory perspectives and how these frameworks fit together to address these issues ...and there is no support from educational institutions around this.”*

Overall therapists interviewed noted that more training and education is needed for occupational therapists in evidenced based interventions to address RRBs with children diagnosed with ASD. *“OTs are well trained in the functional limitations but more knowledge and training in how to intervene is needed.”*

#### **4.4.2 Content analysis.**

Please refer to Table 4 for the reported twenty-four interventions categorized by the PEO Model of occupational performance (Law et al., 1996) and an ABA framework. The classification system used to complete the content analysis was identical to the system used in the integrative review of evidenced based interventions for RRBs in ASD by Patriquin et al. (2017). In the present study, classification was somewhat challenging

as the language used by occupational therapists interviewed did not clearly align with the language used within the evidenced based literature. However, using the previously developed classification system (Patriquin et al., 2017) allowed for comparisons between previously reported evidence-based interventions and those reported by the occupational therapists interviewed for this study.

Some interventions reported by therapists interviewed were general, overall approaches such as sensory integration while others were more specific in the moment, commonly used strategies such as “FIRST/THEN” or “Time and Place” (Lipsky, 2011).

**TABLE 4: INTEVENTIONS REPORTED MAPPED ON TO THE PEO and ABA FRAMEWORKS**

	ANTECEDENTS (Modify Environment and Routine)	ANTECEDENTS (Improve Skills)	CONSEQUENCES	ANTECEDENTS and CONSEQUENCES
PERSON		<ul style="list-style-type: none"> <li>• Teach new skills: sensory motor, motor self-regulation, play, coping</li> <li>• Engage in therapeutic listening (Frick &amp; Young, 2009)</li> <li>• Engage in social thinking approach (Winner, 2007)</li> </ul>		
ENVIRONMENT	<ul style="list-style-type: none"> <li>• Modify the sensory environment</li> <li>• Limit exposure to their intense interest(s) but don't take the interest away</li> <li>• Use visual schedules</li> </ul>		<ul style="list-style-type: none"> <li>• Extinction</li> </ul>	<ul style="list-style-type: none"> <li>• First/Then approach</li> <li>• Time and place approach</li> </ul>

- Educate parents  
(e.g., teach parents to expose their child to new things)
  - Educate daycare workers to modify the environment or perform strategies to improve skills
- OCCUPATION
- Modify/rearrange the order of the daily routine
  - Add more play time
  - Switch up activities
  - Provide specific sensory tools
  - Teach a new alternative replacement behavior (similar to RRB but more functional)
  - Use occupations to expand interests and skills
- PERSON AND OCCUPATION
- Use play to decrease level of arousal
  - Engage in occupation to decrease anxiety and improve cognitive understanding

- Floor time Model (Greenspan & Wieder, 2006) Involving interactive play for skill development in social interaction
- PERSON/  
ENVIRONMENT/  
OCCUPATION
- Sensory diet (Wilbarger & Wilbarger, 1991)
  - Sensory integration intervention (Ayres, 1972)
  - Optimize level of arousal
- PERSON AND  
ENVIRONMENT
- Remove items linked to RRB from the environment for increasing amounts of time in order to build tolerance for not having the item or being triggered by the item
-

Of the twenty-four interventions identified, three were found to exclusively target the person, eight targeted the environment (enhancing the physical or social environment of the child), and six targeted only occupation. Some interventions targeted strategies at two or more aspects of the PEO model: three concurrently targeted the Person and Occupation, three targeted the Person and the Environment, and one targeted Person, Environment, and Occupation

#### ***4.4.2.1 Interventions targeting the person.***

Interventions targeting the person tended to fall under the antecedent (skills) category. Interventions that aimed at improving the skills of the individual to enable occupational performance would occur before the problematic behavior (RRB) occurred. The hope is that by doing so, engagement in more acceptable or appropriate behavior would result, rather than engagement in the RRB.

A number of interventions reported by therapists interviewed were found to fall under the category of person within the PEO model as they aimed at improving the skills of the client. By improving skills as an antecedent strategy, the need to perform the RRB may be decreased if the RRB was being performed secondary to lack of other skills. Examples of interventions reported that targeted the skills of the individual as an antecedent strategy included: Improving motor, cognitive, sensory, or play skills.

#### ***4.4.2.2 Interventions targeting the environment.***

Occupational therapists often aim to impact occupational performance by changing the environment in which the occupation is performed (Patriquin et al., 2017). Eight interventions identified by therapists in this study were considered to primarily



target the environment within the PEO model. Most of these reported interventions were categorized as antecedent based: modifying the environment or routine. One example of an intervention that would fall within these categories is the use of visual schedules. Visual schedules have been found to be effective in decreasing RRB in ASD by allowing the child to be more prepared and more aware of what is going to happen or expected to happen next. Occupational therapists report using this tool to modify the environment. By doing so it encourages engagement in more appropriate or expected occupations rather than RRBs.

Some interventions were antecedent based approaches that modified the environment by enhancing the abilities of others in the child's environment. An example of such an intervention includes providing caregivers with training so that they handle or manage the behavior differently.

#### ***4.4.2.3 Interventions targeting occupation.***

Occupational therapists also aim to influence changes at the level of the occupation within the PEO model to enhance or achieve occupational performance or engagement. Interventions reported were placed in this category when it involved adapting the occupation to accommodate limited skills or certain environments. Interventions were also placed in this category if occupation was used to enhance motivation, optimize level of arousal, or as a reward after performing non-preferred activities.

Occupation may therefore be considered an antecedent approach that either modifies the routine or enhances the skills/behaviors of others. For example, therapists

reported targeting occupation as an antecedent (modifying the routine) intervention approach when they described encouraging or facilitating engagement in a certain occupation that is incompatible with the RRB before engagement in the RRBs occurs.

Encouraging or facilitating a client's engagement in occupation can also be considered an antecedent approach that enhances skills when occupations that are already motivating to the client (perhaps even similar to the RRB) are altered slightly so skills and interests can be improved or broadened.

#### **4.5 Discussion**

Thematic analysis demonstrated that occupational therapists interviewed believe it is appropriate and within an occupational therapist's scope of practice to address RRBs with children with ASD if the RRBs impacts the individual's function in occupations. These behaviors should be addressed by occupational therapists regardless of whether they are motoric or cognitive in nature as both are often inter-related and potentially impact functional performance.

The purpose of this study was to identify the range of interventions and clinical reasoning used by Canadian occupational therapists to address RRBs and to further inform OT practice about how what we are doing aligns with EBP.

Content analysis highlighted similarities and differences between the interventions being used by therapists reported in this study and those identified as evidenced based discovered in the integrative review by Patriquin et al. (2017). Understanding these interventions through the lens of the PEO model (Law et al., 1996) and an ABA framework simultaneously demonstrated a number of points: 1) Some

interventions used by occupational therapists are similar to known evidenced based interventions for RRBs; 2) Some interventions used by occupational therapists are not identified as evidenced based at this time and 3) There are many evidenced based interventions available that fall within an OT practice framework (PEO) but occupational therapists did not report using them at this time.

#### **4.5.1 Similarities between interventions to address RRB reported by Occupational Therapists interviewed and evidenced based interventions.**

Many of the interventions reported by occupational therapists interviewed were similar to the evidenced based interventions identified as effective for decreasing RRBs with children diagnosed with ASD in the integrative review by Patriquin et al. (2017) however they are not exactly the same as they are described using different vocabularies. The evidenced based interventions identified in the integrative review are described using formal behavioral terms and approaches while the interventions reported by therapists interviewed were generally not as formal or defined. For example, terms such as “differential reinforcement” and “circumscribed interests” were two of the evidenced based behavioral interventions identified in the literature review (Patriquin et al., 2017). Whereas the interventions described by occupational therapists interviewed are perhaps less formal in some cases such as “First/Then” or “Time and place”.

The terms used to label and describe the behavioral interventions identified as evidenced based appear as part of a behavioral language that most occupational therapists interviewed were not observed to use. Occupational therapists do not typically think of or describe intervention in terms of antecedents (what happens before) and consequences (what happens after). Often occupational therapists describe setting up situations such as

modifying the environment or the occupation which result in occupational engagement however there does not often seem to be discussion about what happens after the client performs the occupation.

***4.5.1.1 Occupational Therapists report using antecedent approaches to address RRBs when working with children diagnosed with ASD similar to evidence based antecedent approaches.***

Occupational therapists appear to be using a variety of evidenced based interventions to address RRBs. A majority of interventions seem to be antecedent based and often involved modifications to the environment to either increase the likelihood of the preferred behavior (functional occupation) occurring or decrease the likelihood of the problematic behavior (RRB) occurring. Occupational therapy intervention often includes modifying environments physically and in terms of sensory aspects to enable participation and accessibility for individuals despite their abilities and sensitivities (Latham & Radomski, 2002).

Occupational therapists are educated in improving an individual's skills (physical, sensory, and/or cognitive) and modifying the environment to enable occupational engagement. The antecedent type approaches reported as evidenced based involve doing just that.

Modifying or adapting an occupation is also an intervention an occupational therapist would utilize to ensure a person is able to perform that occupation. This would also be considered an antecedent strategy. Most interventions occupational therapists traditionally utilize are antecedent approaches as opposed to consequence approaches.

#### ***4.5.1.2 Evidence for sensory activity as an antecedent approach.***

The thematic analysis of the data collected during interviews highlighted that many therapists believe a sensory and behavioral framework can and should be used together when addressing RRBs with this population.

Occupational therapists often integrate sensory and behavioral knowledge when teaching a child how to self-regulate. Sensory strategies such as deep pressure or proprioceptive activities are often used to move a child into an optimal state of arousal for learning. Behaviorally cognitive re-framing may also be incorporated which is defined as “appraising or interpreting a situation differently by reframing so that it was no longer negative (Morris et al., 2011)”. Within a behavioral frame of reference these strategies may be seen as antecedent approaches that may decrease the need to engage in RRBs.

An example of an intervention that involves using a sensory and behavioral approach simultaneously as an antecedent approach that was noted in the original literature review that was not specifically reported by therapists interviewed was the use of physical exercise (Kern et al., 1984). These authors found that when individuals with ASD engaged in physical exercise preventatively, their RRBs decreased. Although occupational therapists interviewed did not precisely report using physical exercise for this purpose, physical exercise may be similar to those activities occupational therapists describe using with clients to increase or decrease their level of arousal. What occupational therapists call sensory activities may be defined by others as “physical exercise”. Physical exercise is not only a cardiovascular activity; it also requires

engagement of the sensory system. The proprioceptive and vestibular systems as well as the tactile, visual, and perhaps even the auditory systems are being activated during physical activity. Physical exercise has both an arousal component and a sensory component and can be utilized to regulate both. It could be that engagement in occupation that is a sensory activity decreases the need to seek and perform RRBs since it also decreases an individual's level of arousal. The sensory effect of engaging in physical exercise could be the mechanism that decreases the occurrence of RRBs. Further research investigating the sensory components of physical exercises is warranted.

#### **4.5.2 Differences: Occupational therapists tend to focus on different parts of the PEO and ABA models compared to the evidenced based interventions.**

Although similarities between interventions to address RRBs reported by occupational therapists interviewed and interventions identified as part of the integrative review (Patriquin et al., 2017) were noted, content analysis highlighted some differences in patterns of classification of these interventions in relation to which aspect of the PEO model and the behavioral framework were targeted.

##### ***4.5.2.1 Occupational Therapists report using more Person focused antecedent approaches than those identified as evidenced based.***

Many interventions reported by occupational therapists interviewed were found by this researcher to fall under the person aspect of the PEO model of occupational performance while few interventions identified in the integrative review by Patriquin et al. (2017) were found to fall under this category, other than cognitive behavior therapy.

The behavioral interventions identified as part of the integrative review include strategies that controlled the environment before and after in order to influence and shape a target behavior, RRB. The interventions described by therapists interviewed include improving motor skills, sensory processing skills, and play skills. Some believe RRBs occur secondary to missing skills or abilities. Therefore, by improving certain skills the need to perform the RRB may decrease. These skills are part of the person as they describe the abilities they bring to the table.

#### ***4.5.2.2 Occupational therapists are not using consequence type approaches.***

Occupational therapists are clearly intervening using antecedent approaches more often than consequence approaches. Consequence strategies in general appear to be environmental and often seem to involve access or denial of a tangible item, activity or occupation, or even attention.

This may be because occupational therapists feel uncomfortable controlling or denying complete access to RRB considering they may have some beneficial function to the child with ASD. Perhaps it is part of our core beliefs that if an individual chooses to do something or engage in something it must be meaningful to them in some way. That may be true that individuals with ASD may be getting something out of engagement in RRBs. However equally important to consider is the potential that RRBs may be limiting future learning and engagement in new, more functional or sanctioned occupations (Kiepek et al., 2018). Perhaps, as occupational therapists have stated many times, the key is occupational balance (Stadnyk, Townsend, & Wilcock, 2010); some time to spend engaged in RRBs and some time to learn or engage in new, functional occupations.

### **4.5.3 Additional Intervention Options: How to decide.**

There were many evidenced based practices (EBP) used to address RRBs identified as part of the initial literature review that occupational therapists interviewed did not report utilizing as part of their practice. All interventions identified were found to fit within the PEO model of occupation demonstrating relevance to occupational therapy practice. Those interventions include antecedent approaches, consequence approaches, and approaches that are involve use of both antecedents and consequences to promote a desired behavior (engagement in functional meaningful occupation) or decrease engagement in non-preferred behavior (RRB).

It may be that occupational therapists are simply unaware of all the available evidence-based interventions that are available to effectively decrease RRBs or perhaps they are overwhelmed with the possibilities. To help navigate intervention options the occupational therapy literature can provide guidance by reminding us of core professional values and beliefs to determine which intervention options may be the best fit.

#### ***4.5.3.1 Occupational Choice.***

Townsend & Polatajko (2013) describe an underlying belief of occupational therapy, occupational choice. They highlight the importance of allowing individuals to have choice and control related to the occupations they participate in. They explain that “The absence of choice and control results in perceived paternalism, conflict, and limited disclosure” (Townsend & Polatajko, 2013, p. 72).

Individuals with ASD are often denied or discouraged from performing RRBs secondary to the rules and expectations of the environment they are in. RRB may be



similar or related to what Kiepek et al. (2018) describe as non-sanctioned occupations. For example, individuals who perform repetitive behaviors including flapping or spinning are often stopped from performing these behaviors because they are not socially acceptable or distracting to others. Townsend and Polatajko (2013) remind us of the influence that the social environment and culture have on occupational choice stating “Our social group provides us with a framework of unwritten rules that tell us what is okay depending on who we are in social terms” (p.73).

Given this, occupational therapists must weigh the pros and cons of preventing an individual with ASD from engaging in RRBs, knowing that doing so could potentially take away a coping strategy they have developed to control anxiety or level of arousal. In contrast the occupational therapist must also consider how allowing a person with ASD to ignore the unwritten rules of what is considered acceptable in their cultural environment may be limiting as well.

Many of the interventions identified in the initial literature review involved blocking or denying the individual access to RRBs. Interventions including Response Interruption and Redirection/response blocking which involves physically or verbally blocking the individual from engaging in the RRB (Ahearn et al., 2007; Koegal et al., 1974; Liu-Gitz & Banda, 2010). Other interventions do not completely deny RRBs but rather pre-teach missing skills that may mean engagement in RRBs is less likely or needed. The majority of these interventions are antecedent approaches as well that involve improving skills or modifying the environment. Perhaps in light of occupational choice, these interventions may be a better fit with occupational therapy practice.

#### ***4.5.3.2 Occupational Balance and Imbalance.***

Occupational balance defined by Stadnyk, Townsend, & Wilcock (2010) “is a temporal concept since it refers to the allocation of time use for particular purposes and is based on the reasoning that human health and well-being require a variation in productive and leisure occupation” (Townsend & Polatajko, 2013, p.378). Given this definition it could be argued that too much time spent on RRBs, and not enough time or any time engaging in other occupations may also be detrimental to one’s occupational well-being and health.

Twinley (2013) offers some additional thoughts for consideration in relation to occupational balance. She discusses how some occupations may not be productive or health promoting but may still provide a sense of well-being for the individual. RRBs may be viewed in this way since there are potentially positive in some ways but may also have negative effects when engagement is so much that other aspects of learning, enjoyment, or engagement are limited. Occupational balance for an individual with ASD may mean time to engage in RRBs that would allow the individual to experience all the meaningful benefits they may offer but also time not engaging in RRB that would allow opportunities to learn and engage in other productive, or perhaps more functional tasks. A “First/Then” or “Time and Place” approach does just this, allowing engagement in the RRBs but in a controlled or balanced way. This may mean allowing engagement after performing a non-preferred task (First/Then) or at a specific time and in a controlled or specific environment (Time and place).

#### ***4.5.3.3 Occupation Based Practice.***

There is a drive for our profession to return to our roots of occupation-based practice knowing a relationship between engagement in meaningful occupation and health/ well-being exists. Bagatell & Mason (2015) examined the history of occupational therapy with individuals diagnosed with ASD and recommend a more occupation-based approach compared to a deficit based approach. These authors describe the need for occupational therapy to focus on the occupational needs and desires of individuals with ASD.

One of the evidenced based interventions identified in the integrative review (Patriquin et al., 2017) that was found to target the occupation aspect of the PEO Model was physical exercise (Kern, Koegel, & Dunlap, 1984). Other interventions named in the integrative review that targeted occupation as well as environment included antecedent based uses of circumscribed interests (Baker, Koegel, & Koegel, 1998) and environmental enrichment strategies (Piazza, Adelinis, Hanley, Goh, & Delia, 2000; Rapp, Vollmer & Timothy, 2005; Vollmer & Others, 1994). These interventions may fit well with occupational therapy practice, values, and beliefs.

#### **4.6 Study Limitations**

Given that such a small number of therapists were interviewed the reported interventions may not represent the full scope of interventions currently used in practice. Additionally, the findings of this study may not be generalizable to the entire occupational therapy community.

It is also possible that perhaps the questions asked as part of the interview process were not clear enough to elicit responses about intervention that were more specific

which may have allowed them to be more comparable to the evidenced based interventions identified in the integrative review (Patriquin et al., 2017).

#### **4.7 Future Direction**

This study revealed areas that require further study within the field of occupational therapy. Occupational therapists have a strong understanding of the impact that RRBs may have in relation to functional performance. However, there is insufficient evidence supporting some of the interventions being used and there are many evidenced based interventions already identified that occupational therapists could be using to help clients.

1. Occupational therapists may need to have more training to gain a greater understanding of behavioral approaches to intervention related to RRBs and thinking in terms of timing of interventions. For example, using the many antecedent approaches identified, before the behavior occurs as preventative strategies and also the variety of consequence-based approaches that either reinforce the new behaviors or deter the RRBs. By gaining a greater understanding of a behavioral frame of reference related to RRBs perhaps occupational therapists would be more likely to use the evidenced based interventions identified in the initial literature review (Patriquin et al., (2017), particularly those not reported by therapists interviewed.
2. Occupational therapists should consider being more objective and clear when defining the intervention approach, they are using. This clarity will enable greater accuracy and ease in terms of data collection. Taking these steps will enable

better research to be completed and help us know what is effective and what is not.

3. Opportunities for future research exist in terms of specific comparison of what therapists reported as interventions being used to address RRBs in OT practice to the evidence based interventions identified in the integrative review.

## **CHAPTER 5 CONCLUSION**

### **5.1 Summary**

This research opportunity has allowed me to gain a greater understanding of the multifaceted aspects of RRBs experienced by children with ASD: the negative including the functional limitations and also the possible benefits or reasons for engagement in these behaviors for this population. The integrative review in Chapter 2 allowed me to identify the evidenced based intervention found to address RRBs and how they potentially aligned with occupational therapy practice. Chapter 3 describes the methodology planned to conduct the next stages of my research which involved interviewing Canadian occupational therapists from across the county to determine if and how they are currently addressing these behaviors. Chapter 4 describes the results of this study. Also described is the thematic and content analysis used to identify patterns of information reported by therapists interviewed as well as the similarities and differences between the evidenced based interventions identified in the integrative review and those interventions reported by therapists interviewed. The work completed has led to many implications for occupational therapists working with individuals with ASD who engage in RRB.

### **5.2 Implications for Occupational Therapy practice**

A goal of occupational therapy is enabled engagement in meaningful occupations and achievement of occupational well-being. As occupational therapists working with this population we must consider all aspects and possible functions of RRBs for each client.

Twinley (2013) described how occupation can be multifaceted, that although we often describe how occupation contributes to one's well being, sometimes occupation has

a dark side and may not promote health or well being. RRBs have the potential to diminish occupational well being as they can occupy so much of one's time that engagement in other occupations does not occur. If RRBs are preventing engagement in other occupations then part of our role should be to help decrease time spent engaging in those RRBs.

However if RRBs are allowing an individual to decrease their level of arousal or feelings of anxiety, thereby enabling engagement in other occupations this must be taken into account as well. By considering both positive and negative consequences of RRBs, occupational therapists can prevent potential occupational alienation, deprivation, and marginalization by ensuring occupational choice, occupational balance and resulting in occupational well-being,

The integrative review identified a variety of evidenced based interventions that consider both antecedent and consequence based approaches related to decreasing RRBs that were then mapped onto an occupational therapy framework. The research that followed demonstrated how the interventions occupational therapists reported using in practice relate to those evidenced based interventions emphasizing both similarities and differences. Identified differences have highlighted potential opportunities for change or growth in occupational therapy practice, education, and research.

Overall it was discovered that occupational therapists are utilizing more antecedent approaches than consequence based approaches in practice. This suggests that there are many different possible consequences based approaches that occupational therapists could be utilizing in practice to address RRB with this population. There are also additional antecedent and combination antecedent/consequence based approaches

identified as evidenced based that were not specifically named by therapists interviewed that could also be incorporated into practice.

Some of the interventions identified by therapists interviewed were not found to align with any of the evidenced based interventions identified as part of the integrative review. There may be various reasons for this.

It is possible that these interventions have simply not been subjected to research at this point. Also, an important consideration in regards to this is that many of the interventions reported by therapists interviewed that did not align with the evidenced based interventions identified were those that fell under the occupation aspect of the PEO Model. Since the interventions that were identified as part of the integrative review are those known more commonly within the field of psychology it's not surprising that occupation based interventions may not be included in that research.

By conceptualizing RRBs as potentially having some type of function, RRBs will be better understood and utilized to achieve enhanced occupational engagement and therefore optimal health and well-being. Using RRBs or a similar form of RRB as a therapeutic agent, rather than aiming to block or stop this behavior is worth considered as doing so in practice may be a better fit for occupational therapists.

Integrating occupation based interventions with the antecedent and consequence based approaches that have been shown to be effective into occupational therapy practice is something for all occupational therapists working with this population to consider for practice. Occupations can be used as antecedent approaches to achieve an optimal level of arousal so that engagement in other occupations is more likely. Personally meaningful occupations can be used as consequence strategies that reinforce engagement in other



occupations or behaviors. Modified occupations can also be used as alternative replacement behaviors; occupations that are similar and/or related to the RRBs but changed to be less disruptive or more acceptable within a given context.

### **5.3 Implications for Occupational Therapy Education**

Occupational therapists interviewed believe in the importance of understanding and utilizing evidenced based interventions when addressing RRBs in children with ASD. Research completed related to identified evidenced based interventions for RRBs are primarily outlined using an ABA behavioral intervention framework and fittingly Occupations therapists interviewed reported the importance of understanding a behavioral framework so that effective and efficient use of these behavioral interventions is achieved.

All therapists interviewed reported feeling that they did not receive training or education related to RRBs or behavioral frameworks such as an ABA approach during their initial occupational therapy degrees. Therapists interviewed reported feeling that more education in this area of practice should be important during initial occupational therapy education. A relevant side-note to ponder is that much has been learned in regards to ASD and effective interventions over the past 10-20 years and that educational programs are constantly changing with increased knowledge. For those therapists who have already graduated consideration of continuing education related to an ABA approach may be something to consider.

Some therapists interviewed also reported that changes in occupational therapy education related to sensory processing/integration have occurred over the years resulting in new graduates having very little knowledge related to these concepts.

Some of these therapists believed that when the call for more evidence related to sensory processing assessment and intervention was recommended, many therapists chose to stop using sensory frameworks altogether rather than attempting to conduct research to demonstrate effectiveness. Meanwhile other professions seemed to be considering aspects of sensory processing more often than they once did.

Occupational therapy education is ultimately going to be guided by research. Conducting more research related to both sensory and behavioral interventions is crucial to understanding what is effective and what is not in the treatment of RRBs with this population.

#### **5.4 Implications for Occupational Therapy Research**

Findings resulting from the study outlined in Chapter 4 revealed patterns and differences in the interventions found to be evidenced based and those reported by occupational therapists interviewed.

Occupational therapists reported many interventions that fell under the environment and the person aspects of the PEO Model of occupational performance while evidenced based interventions identified were fewer under the person aspect and more numerous under environment. These differences highlight potential opportunities for future research. Perhaps more evidence is needed to support interventions targeting

the person. For example, completing research looking at if improving motor skills does in fact decrease RRBs with individuals diagnosed with ASD.

In addition, differences in the language used to describe the evidenced based interventions identified and those reported by therapists was noted. Occupational therapists may want to consider explaining occupational therapy interventions they are using in practice more clearly and perhaps in relation to the behavioral terms for research purposes so they will be more relatable and more easily understood by other professionals.

Overall many opportunities for research exist on both small and large scales that will aim to either prove or disprove specific interventions are effective in the treatment of RRBs. There are countless opportunities for research that incorporate the use of occupation into intervention for RRBs and this population. This research will guide occupational therapy education and practice.

## **5.5 Personal Educational Pursuit**

This investigative journey was prompted by a personal feeling of professional pressure to have in depth knowledge and understanding of RRBs best practices to address these behaviors how these interventions aligned with an occupational therapy practice framework. This was achieved through completion of the integrative review.

To relate these findings to current practice in Canada, to understand the clinical reasoning Canadian occupational therapists are using when deciding on interventions, and how those interventions aligned with the evidenced based interventions the descriptive interview study was completed. Analysis of the data collected from

occupational therapists interviewed allowed comparison between interventions being used by occupational therapists in Canada and the evidenced based interventions identified in the integrative review. Doing so highlighted what occupational therapists are currently doing that is evidence based and what other options may be available. To help determine which remaining interventions align with the values and beliefs of the occupational therapy profession, occupational therapy concepts including occupational choice, occupational balance, and occupation-based practice were discussed.

I feel this completed research has helped educate and guide me professionally in terms of when it is appropriate or needed to address RRBs with this population and what intervention options are available and fitting for my clients. As a result of this research there are also some lingering thoughts for consideration in terms of occupational therapy practice, education, and future research.

## References

- Ahearn, William H., Clark, Kathy M., MacDonald, Rebecca P. F., & Chung, Bo In. (2007). Assessing and Treating Vocal Stereotypy in Children with ASD. *Journal of Applied Behavior Analysis*, 40(2), 263-275.
- American Psychological Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Athens, Elizabeth S., Vollmer, Timothy R., Sloman, Kimberly N., & Pipkin, Claire St. Peter. (2008). An Analysis of Vocal Stereotypy and Therapist Fading. *Journal of Applied Behavior Analysis*, 41(2), 291-297.
- Ayres, A.J. (1972) *Sensory Integration and Learning Disorders*. Los Angeles, CA: Western Psychological Services.
- Azrin N.H., Besalel V, Jamner J.P., & Caputa J.N. (1988). Comparative study of behavioral methods of treating severe self-injury. *Behavior Resident Treatment*; 3, 119–152.
- Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 1(1), 91–97.  
<http://doi.org/10.1901/jaba.1968.1-91>
- Bagatell, N. & Mason, A. (2015). Looking Backward, Thinking Forward: Occupational Therapy and ASD Spectrum Disorders. *OTJR: Occupation, Participation and Health*, 35(1), 34-41.
- Baker, M. (2000). Incorporating the Thematic Ritualistic Behaviors of Children with ASD into Games: Increasing Social Play Interactions with Siblings. *Journal of Positive Behavior Interventions*, 2(2), 66-84.
- Baker, M. J., Koegel, R. L., & Koegel, L. K. (1998). Increasing the social behavior of young children with ASD using their obsessive behaviors. *Journal of the Association for Persons with Severe Handicaps*, 23(4), 300-308.  
doi:10.2511/rpsd.23.4.300
- Bejerot, S. (2007). An autistic dimension: A proposed subtype of obsessive-compulsive disorder. *ASD: The International Journal of Research & Practice*, 11(2), 101-110.  
doi:10.1177/1362361307075699

- Bernard, H. (Ed.). (1988). 1. Research methods in cultural anthropology  
Sage Publications.
- Boyd, Brian A., Conroy, Maureen A., Mancil, G. Richmond, Nakao, Taketo, & Alter, Peter J. (2007). Effects of Circumscribed Interests on the Social Behaviors of Children with ASD Spectrum Disorders. *Journal of ASD and Developmental Disorders*, 37(8), 1550-1561.
- Boyd, B.A., Baranek, G.T., Sideris, J., Poe, M., Watson, L.R., Patten, E. (2010). Sensory features and repetitive behaviors in children with ASD and developmental delays. *ASD Research*; 3, 78–87.
- Boyd, Brian A., McDonough, Stephen G., Rupp, Betty, Khan, Faraaz, & Bodfish, James W. (2011). Effects of a Family-Implemented Treatment on the Repetitive Behaviors of Children with ASD. *Journal of ASD and Developmental Disorders*, 41(10), 1330-1341.
- Boyd, B.A., Woodard, C.R., Bodfish, J.W. (2013). Feasibility of exposure response prevention to treat repetitive behaviors of children with ASD and an intellectual disability: A brief report. *ASD: The International Journal of Research and Practice*;17(2):196-204.
- Boyd, B. A., McDonough, S. G., & Bodfish, J. W. (2012). Evidence-based behavioral interventions for repetitive behaviors in ASD. *Journal of ASD and Developmental Disorders*, 42, 1236-48. doi:<http://dx.doi.org/10.1007/s10803-011-1284-z>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. doi:10.1191/1478088706qp063oa
- Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member checking: A tool to enhance trustworthiness or merely a nod to validation? *Qualitative Health Research*, 22 June 2016.
- Britton, L.N., Carr, J.E., Landaburu, H.J., Romick, K.S. (2002). The efficacy of noncontingent reinforcement as treatment for automatically reinforced stereotypy. *Behavioral Interventions*;17(2):93-103.
- Canadian Association of Occupational Therapists. (2008). CAOT position statement: Occupations and health. *Occupational Therapy Now*, 11(1), 2426.
- Carr, Edward G., & Durand, V. Mark. (1985). Reducing Behavior Problems through Functional Communication Training. *Journal of Applied Behavior Analysis*, 18(2), 111-26.

- Carr, James E., Dozier, Claudia L., Patel, Meeta R., Adams, Amanda Nicolson, & Martin, Nichelle. (2002). Treatment of Automatically Reinforced Object Mouthing with Noncontingent Reinforcement and Response Blocking: Experimental Analysis and Social Validation. *Research in Developmental Disabilities, 23*(1), 37-44.
- Charlop-Christy, Marjorie H., & Haymes, Linda K. (1996). Using Obsessions as Reinforcers with and without Mild Reductive Procedures to Decrease Inappropriate Behaviors of Children with ASD. *Journal of ASD and Developmental Disorders, 26*(5), 527-46.
- Cicero, F.R. (2007). The effects of noncontingent reinforcement and response interruption on stereotypic behavior maintained by automatic reinforcement [dissertation]. New York: City: University of New York.
- Conroy, M., Asmus, J., Sellers, J., & Ladwig, C. (2005). The Use of an Antecedent-Based Intervention to Decrease Stereotypic Behavior in a General Education Classroom: A Case Study. *Focus on ASD and Other Developmental Disabilities, 20*(4), 223-230.
- Dunst, C.J., Trivette, C.M., Hamby, D.W. (2012). Meta-analysis of studies incorporating the interests of young children with ASD spectrum disorders into early intervention practices. *ASD Research and Treatment: 1–10*.
- Durig, A. (1996). *ASD and the crisis of meaning*. Albany, NY: State University of New York Press.
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing, 62*(1), 107-115. doi:10.1111/j.1365-2648.2007.04569.x
- Erlandsson, L., Eklund, M., & Persson, D. (2011). Occupational value and relationships to meaning and health: Elaborations of the ValMO-model. *Scandinavian Journal of Occupational Therapy, 18*(1), 72. doi:10.3109/11038121003671619
- Fisher, A. G. (2014). Occupation-centered, occupation-based, occupation-focused: Same, same or different? *Scandinavian Journal of Occupational Therapy, 21*, 96-107. doi:10.3109/11038128.2014.952912
- French, G. (2001). Challenging the role of occupational therapists in clinical practice: An environmental perspective. *Australian Occupational Therapy Journal, 48*(4), 176-180. doi:10.1046/j.0045-0766.2001.00271.x

- Frick, S., Young, Sally. (2009). *Listening with the Whole Body: clinical concepts and treatment guidelines for therapeutic listening*. Vital Links; Madison, WI.
- Grahame, Victoria, Brett, Denise, Dixon, Linda, McConachie, Helen, Lowry, Jessica, Rodgers, Jacqui, . . . Le Couteur, Ann. (2015). *Managing Repetitive Behaviors in Young Children with ASD Spectrum Disorder (ASD): Pilot Randomised Controlled Trial of a New Parent Group Intervention*. *Journal of ASD and Developmental Disorders*, 45(10), 3168-3182.
- Hine, J.F. & Wolery, M. (2006). *Using point-of-view video modeling to teach play to preschoolers with ASD*. *Topics in Early Childhood Special Education* 2006; 26(2), 83-93.
- Horner, Robert H., Day, H. Michael, & Day, Julie R. (1997). *Using Neutralizing Routines to Reduce Problem Behaviors*. *Journal of Applied Behavior Analysis*, 30(4), 601-14.
- Humphry, R. (2002). *Young children's occupations: Explicating the dynamics of developmental processes*. *American Journal of Occupational Therapy*, 56(2), 171-179. Retrieved from <http://ezproxy.library.dal.ca/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=c8h&AN=106941137&site=ehost-live>
- Iwata, B., Dorsey, M., Slifer, K., Bauman, K., & Richman, G. (1994). *Toward a functional analysis of self-injury*. *Journal of Applied Behavior Analysis*, 27(2), 197-209.
- Joosten, A., Bundy, A., & Einfeld, S. (2012). *Context Influences the Motivation for Stereotypic and Repetitive Behavior in Children Diagnosed with Intellectual Disability with and without ASD*. *Journal of Applied Research in Intellectual Disabilities*, 25(3), 262-271.
- Joosten, A. V., & Bundy, A. C. (2010). *Sensory processing and stereotypical and repetitive behavior in children with ASD and intellectual disability*. *Australian Occupational Therapy Journal*, 57(6), 366-372. doi:10.1111/j.1440-1630.2009.00835.x



- Kang, S., O'Reilly, M., Rojeski, L., Blenden, K., Xu, Z. & Davis, T. (2013). Effects of tangible and social reinforcers on skill acquisition, stereotyped behavior, and task engagement in three children with ASD spectrum disorders. *Research in Developmental Disabilities: A Multidisciplinary Journal* 2013; 34(2):739-744.
- Kennedy, C. H., Meyer, K. A., Knowles, T., & Shukla, S. (2000). Analyzing the multiple functions of stereotypical behavior for students with ASD: Implications for assessment and treatment. *Journal of Applied Behavior Analysis*, 33(4), 559-71. doi:10.1901/jaba.2000.33-559
- Kern, L., Koegel, R., & Dunlap, G. (1984). The influence of vigorous versus mild exercise on autistic stereotyped behaviors. *Journal of ASD and Developmental Disorders*, 14(1), 57-67. doi:10.1007/BF02408555
- Kielhofner, G. (Ed.) (1995). *A model of human occupation: Theory and application* (2nd edn). Baltimore: Williams & Wilkins
- Kiepek, N., & Magalhães, L. (2011). Addictions and impulse-control disorders as occupation: A selected literature review and synthesis. *Journal of Occupational Science*, 18(3), 254-276. doi:10.1080/14427591.2011.581628
- Kiepek, N., Beagan, B., Laliberte-Rudman, D., & Phelan, S. (2018) Silences around occupations framed as unhealthy, illegal, and deviant, *Journal of Occupational Science*, doi: 10.1080/14427591.2018.1499123
- Koegel, R. L., Firestone, P. B., Kramme, K. W., & Dunlap, G. (1974). Increasing spontaneous play by suppressing self-stimulation in autistic children. *Journal of Applied Behavior Analysis*, 7(4), 521-528. doi:10.1901/jaba.1974.7-521
- Kuhn, D. E., Hardesty, S. L., & Sweeney, N. M. (2009). Assessment and treatment of excessive straightening and destructive behavior in an adolescent diagnosed with ASD. *Journal of Applied Behavior Analysis*, 42(2), 355-360. doi:10.1901/jaba.2009.42-355
- Lam, K. S. L., & Aman, M. G. (2007). The repetitive behavior scale- revised: Independent validation in individuals with ASD spectrum disorders. *Journal of ASD and Developmental Disorders*, 37(5), 855-866. doi:10.1007/s10803-006-0213-z
- Latham, C., & Radomski, M. V. (2002). *Occupational therapy for physical dysfunction* (5th ed.). Philadelphia: Lippincott Williams & Wilkins.

- Law, M., Cooper, B. A., Strong, S., Stewart, D., Rigby, P., & Letts, L. (1996). The person-environment-occupational model: A transactive approach to occupational performance. *Canadian Journal of Occupational Therapy*, 63, 9--23. doi: 10.1177/000841749606300103
- Law, M. & Baum, C. (2005). Measurement in occupational therapy. In M. Law, C. Baum & W. Dunn (Eds), *Measuring occupational performance* (2<sup>nd</sup> ed.). Thorofare, NJ: SLACK Incorporated.
- Law, M., Baptiste, S., & Mills, J. (1995). Client-centered practice: What does it mean and does it make a difference? *Canadian Journal of Occupational Therapy*, 62(5), 250-257. doi:10.1177/000841749506200504
- Lehmkuhl, Heather D., Storch, Eric A., Bodfish, James W., & Geffken, Gary R. (2008). Brief Report: Exposure and Response Prevention for Obsessive Compulsive Disorder in a 12-Year-Old with ASD. *Journal of ASD and Developmental Disorders*, 38(5), 977-981.
- Lipsky, D. (2011). From anxiety to meltdown how individuals on the ASD spectrum deal with anxiety, experience meltdowns, manifest tantrums, and how you can intervene effectively. London ; Philadelphia: Jessica Kingsley.
- Liu-Gitz L, Banda DR. A replication of the RIRD strategy to decrease vocal stereotypy in a student with ASD. *Behavioral Interventions*. 2010; 25(1):77-87.
- Loftin, Rachel L., Odom, Samuel L., & Lantz, Johanna F. (2008). Social Interaction and Repetitive Motor Behaviors. *Journal of ASD and Developmental Disorders*, 38(6), 1124-1135.
- Lough, C. L., Rice, M. S., & Lough, L. G. (2012). Choice as a strategy to enhance engagement in a coloring task in children with ASD spectrum disorders. *Occupational Therapy International*, 19(4), 204-211. doi:10.1002/oti.1337
- Love, Jessica J., Miguel, Caio F., Fernand, Jonathan K., & LaBrie, Jillian K. (2012). The Effects of Matched Stimulation and Response Interruption and Redirection on Vocal Stereotypy. *Journal of Applied Behavior Analysis*, 45(3), 549-564
- Miller, Neal, & Neuringer, Allen. (2000). Reinforcing Variability in Adolescents with ASD. *Journal of Applied Behavior Analysis*, 33(2), 151-65

- Morris, A. S., Silk, J. S., Morris, M. D. S., Steinberg, L., Aucoin, K. J., & Keyes, A. W. (2011). The influence of mother-child emotion regulation strategies on children's expression of anger and sadness. *Developmental Psychology*, 47(1), 213-225. doi:10.1037/a0021021
- Murdock, L., Dantzler, J., Walker, A., & Wood, L. (2014). The Effect of a Platform Swing on the Independent Work Behaviors of Children With ASD Spectrum Disorders. *Focus on ASD and Other Developmental Disabilities*, 29(1), 50-61.
- Njelesani, J., Teachman, G., Durocher, E., Hamdani, Y., & Phelan, S. K. (2015). Thinking critically about client-centered practice and occupational possibilities across the life-span. *Scandinavian Journal of Occupational Therapy*, 2015, Vol.22; 22(4; 4), 252; 252-259; 259. doi:10.3109/11038128.2015.1049550
- Odom, S. L., Brown, W. H., Frey, T., Karasu, N., Lee Smith-Canter, L., & Strain, P. S. (2003). Evidence-based practices for young children with ASD: Contributions for single-subject design research. *Focus on ASD and Other Developmental Disabilities*, 18(3), 166-175. doi:10.1177/10883576030180030401
- Odom, S. L., Collet-Klingenberg, L., Rogers, S. J., & Hatton, D. D. (2010). Evidence-based practices in interventions for children and youth with ASD spectrum disorders. *Preventing School Failure*, 54(4), 275-282. doi:10.1080/10459881003785506
- Palys, T. (Ed.). (1988). *The sage encyclopedia of qualitative research methods. Research methods in cultural anthropology. Purposive sampling* (L. M. Given (Ed.) ed.). Los Angeles,: Sage Publications.
- Patterson, S., Smith, V., & Jelen, M. (2010). Behavioral intervention practices for stereotypic and repetitive behavior in individuals with ASD spectrum disorder: A systematic review. *Developmental Medicine & Child Neurology*, 52(4), 318-327.
- Patriquin, M., MacKenzie, D., Versnel, J. (2017) Restricted and Repetitive Behavior in Persons with ASD (Ages 0-18): An Integrative Review of Treatment Related to Occupational Therapy. *Journal of Intellectual Disability - Diagnosis and Treatment*, 5(3), 61-76. doi: <http://dx.doi.org/10.6000/2292-2598.2017.05.03.1>
- Piazza, C., Adelinis, J., Hanley, G., Goh, H., & Delia, M. (2000). An Evaluation of the effects of matched stimuli on behaviors maintained by automatic reinforcement. *Journal of Applied Behavior Analysis*, 33(1), 13-27.

- Rapp, John T., Vollmer, & Timothy R. (2005). Stereotypy I: A Review of Behavioral Assessment and Treatment. *Research in Developmental Disabilities: A Multidisciplinary Journal*, 26(6), 527-547.
- Rapp, John T. (2007). Further Evaluation of Methods to Identify Matched Stimulation. *Journal of Applied Behavior Analysis*, 40(1), 73-88.
- Reaven, J., & Hepburn, S. (2003). Cognitive-Behavioral Treatment of Obsessive-Compulsive Disorder in a Child with Asperger Syndrome: A Case Report. *ASD*, 7(2), 145-164.
- Rehfeldt, R., & Chambers, M. (2003). Functional analysis and treatment of verbal perseverations displayed by an adult with ASD. *Journal of Applied Behavior Analysis*, 36(2), 259-261.
- Roane, H., Kelly, M., & Fisher, W. (2003). The effects of noncontingent access to food on the rate of object mouthing across three settings. *Journal of Applied Behavior Analysis*, 36(4), 579-582.
- Rodgers, J., Glod, M., Connolly, B., & McConachie, H. (2012). The Relationship between Anxiety and Repetitive Behaviors in ASD Spectrum Disorder. *Journal of ASD and Developmental Disorders*, 42(11), 2404-2409.
- Rodriguez, N., Thompson, R., Stocco, C., & Schlichenmeyer, K. (2013). Arranging and ordering in ASD spectrum disorder: Characteristics, severity, and environmental correlates. *Journal of Intellectual & Developmental Disability*, 38(3), 242.
- Samson, A. C., Phillips, J. M., Parker, K. J., Shah, S., Gross, J. J., & Hardan, A. Y. (2014). Emotion dysregulation and the core features of ASD spectrum disorder. *Journal of ASD and Developmental Disorders*, 44(7), 1766-72. doi:<http://dx.doi.org/10.1007/s10803-013-2022-5>
- Searle, J. R. (1992). *The rediscovery of the mind*. Cambridge, MA: The MIT Press.
- Sidener, T. M., Carr, James E., & Firth, Amanda M. (2005). Superimposition and Withholding of Edible Consequences as Treatment for Automatically Reinforced Stereotypy. *Journal of Applied Behavior Analysis*, 38(1), 121-4.
- Spitzer, S. (2003). Using participant observation to study the meaning of occupations of young children with ASD and other developmental disabilities. *The American Journal of Occupational Therapy*, 57(1), 66-76. doi:10.5014/ajot.57.1.66

- Stadnyk, R., Townsend, E.A., & Wilcock, A.A., (2010) Occupational justice. In C.H. Christensen, E.A. Townsend (Eds.), *Introduction to occupations: The art and science of living* (2<sup>nd</sup> ed.), (pp 329-358). Upper Saddle River, NJ: Prentice Hall.
- Storch, Eric A., Arnold, Elyse B., Lewin, Adam B., Nadeau, Josh M., Jones, Anna M., De Nadai, Alessandro S., . . . Murphy, Tanya K. (2013). The Effect of Cognitive-Behavioral Therapy versus Treatment as Usual for Anxiety in Children with ASD Spectrum Disorders: A Randomized, Controlled Trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, 52(2), 132-142.e2.
- Tarbox, J., Wallace, M. D., & Tarbox, R. S. F. (2002). Successful generalized parent training and failed schedule thinning of response blocking for automatically maintained object mouthing. *Behavioral Interventions*, 17(3), 169-178.
- Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*, 27(2), 237-246.  
doi:10.1177/1098214005283748
- Tomlin, G., & Borgetto, B. (2011). Research pyramid: A new evidence-based practice model for occupational therapy. *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association*, 65(2), 189. doi:10.5014/ajot.2011.000828
- Townsend, E & Polatajko, H. (2013). *Enabling occupation II: Advancing an occupational therapy vision for health, well-being*. Ottawa: ON: Canadian Association of Occupational Therapists. ACE.
- Townsend, E., & Wilcock, A. (2004). Occupational justice and client-centered practice A dialogue in progress. *The Canadian Journal of Occupational Therapy*, 71(2), 75-87.
- Tremblay, M. (1957). The Key Informant Technique: A Nonethnographic Application. *American Anthropologist*, 59(4), 688-701.
- Twinley, R. (2013). The dark side of occupation: A concept for consideration. *Australian Occupational Therapy Journal*, 60(4), 301–303.
- Vollmer, Timothy R., & Others. (1994). Treatment of Self-Injury and Hand Mouthing Following Inconclusive Functional Analyses. *Journal of Applied Behavior Analysis*, 27(2), 331-44.

- Watling, R., Deitz, J., Kanny, E., & McLaughlin, J. (1999). Current practice of occupational therapy for children with ASD. *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association*, 53(5), 498-505.
- Whiteford, G. (2003). When people cannot participate: Occupational Deprivation. In C. Christensen and E. Townsend (Eds). *An introduction to occupation: The art and science of living*. (pp.221-242). Upper Saddle River, NJ: Prentice Hall.
- Wigham, S., Rodgers, J., South, M., McConachie, H., & Freston, M. (2015). The interplay between sensory processing abnormalities, intolerance of uncertainty, anxiety and restricted and repetitive behaviors in ASD spectrum disorder. *Journal of ASD and Developmental Disorders*, 45(4), 943-952.
- Wilbarger, P., & Wilbarger, Julia Leigh. (1991). *Sensory defensiveness in children aged 2-12: An intervention guide for parents and other caretakers*. Santa Barbara, Calif.: Avanti Educational Programs.
- Wilcock, A. & Hocking, C (2013). *An occupational perspective of health* 3<sup>rd</sup> edition. Thorofare, NJ: SLACK Incorporated.
- Winner, M. (2007). *Thinking about you, thinking about me: "Teaching perspective taking and social thinking to persons with social cognitive learning challenges"*-Cover (2nd ed.). San Jose, CA: Think Social.

## APPENDIX A: RECRUITMENT EMAIL



**Project Title:** Investigating current occupational therapy practice and application of evidence based interventions for restricted and repetitive behavior in children with ASD ages 0-18

**Lead Researcher:** Melissa Patriquin OT Reg(NS)

[Melissa.Patriquin@dal.ca](mailto:Melissa.Patriquin@dal.ca)/ 902-754-5891

*The lead investigator will email the script below to invite potential participants to find out more about the research and receive the study information letter, interview questions, and informed consent form from the researcher:*

Hello,

You are invited to take part in a research study being conducted at Dalhousie University by Melissa Patriquin OT Reg (NS), as part of the Post Professional Masters in Occupational Therapy program. Choosing whether or not to take part in this research is entirely your choice. The information below tells you a bit about what is involved in the research and what you will be asked to do.

Restricted and Repetitive Behavior (RRB) is a core problematic issue experienced by individuals diagnosed with ASD that often impedes functional behavior. Occupational Therapy's goal is to help clients overcome functional limitations in order to achieve greater independence and success in tasks. Addressing the RRBs experienced by those

with ASD is therefore often a part of an occupational therapist's treatment plan with this population. Many theories related to the cause of RRBs in ASD exist, resulting in a variety of intervention options available to clinicians.

The purpose of this study is to determine what interventions and/or approaches occupational therapists are using to address this functionally limiting issue. Occupational Therapists who have experience (in the past 5 years) working with children with ASD (ages 0-18) are invited to be part of this research.

The anticipated outcome of this study is to determine the trends in treatment approaches being used by occupational therapists in Canada to address RRBs with individuals diagnosed with ASD (ages 0-18), how are therapists deciding what interventions to use, and what unique perspective do occupational therapists have in relation to function and RRB. It is anticipated that the results from this study will help to guide practice of occupational therapists working with children with ASD experiencing functional issues related to RRBs.

If you are interested in learning more about this study, please email me at [Melissa.Patriquin@dal.ca](mailto:Melissa.Patriquin@dal.ca). Upon hearing from you I will send you the following: 1. The Study Information letter; 2. The Proposed Interview Questions; and 3. The Informed Consent to participate form. Please feel free to ask any questions you may have.



## APPENDIX B: STUDY INFORMATION LETTER



**Project title:** Investigating current occupational therapy practice and applicable evidence based interventions for restricted and repetitive behavior in children with ASD ages 0-18 and repetitive behavior in children with ASD ages 0-18

**Lead researcher:** Melissa Patriquin OT Reg (NS)

Post Professional Master's Program in Occupational Therapy

School of Occupational Therapy, Dalhousie University

[Melissa.Patriquin@dal.ca](mailto:Melissa.Patriquin@dal.ca)/ 902-754-5891

### **Other researchers**

Dr. Diane MacKenzie, School of Occupational Therapy, Dalhousie University

Dr. Joan Versnel, School of Occupational Therapy, Dalhousie University

### **Purpose and Outline of the Research Study**

Restricted and Repetitive Behavior (RRB) is a core problematic issue experienced by individuals diagnosed with ASD that often impedes functional behavior. Occupational Therapy's goal is to help clients overcome functional limitations in order to achieve greater independence and success in tasks therefore addressing the RRBs experienced by those with ASD is often part of an occupational therapist's treatment plan with this population. Many theories related to the cause of RRBs in ASD exist, resulting in a variety of intervention options available to clinicians.

The purpose of this study is to determine what interventions/approaches occupational therapists are using to address this functionally limiting issue. Occupational Therapists who have experience working with children with ASD (ages 0-18) in the past 5 years are invited to be part of this research.

The anticipated outcome of this study is to determine what treatment approaches are being used by occupational therapists in Canada to address RRBs with individuals diagnosed with ASD (ages 0-18), how are therapists deciding what interventions to use, and what unique perspective do occupational therapists have in relation to this concern. It is anticipated that the results from this study will help other occupational therapists working with children with ASD, who experience RRBs to guide their practice.

### **Who Can Take Part in the Research Study**

This study is voluntary. You may participate in this study if you are a Canadian occupational therapist who is working with or has worked (in the past 5 years) with children diagnosed with ASD (ages 0-18) presenting with restricted and repetitive behaviors.

### **What You Will Be Asked to Do**

An interview format will be used to gather information over the telephone at a time that is convenient for volunteer participants. A study information letter, informed consent form and interview questions will be sent by email to each participant who has expressed interest in the study.

It is anticipated that the interview will include 6-10 questions and will take between 30 minutes and one hour to complete. Interviews may be audio recorded if the participant has consented to do so. Upon completion of the research the recording will be destroyed. If the participant chooses to not have their interview recorded, the lead researcher will take notes as the interview is conducted. Participants will have the opportunity to consent or not consent to being anonymously quoted in the final report. Information provided by each participant and collected by this researcher will be sent back to the original therapist to review for clarity and accuracy following the interview and before analysis of the data.

If you are interested in participating in this study, or if you have any questions about the study, please email the lead researcher, Melissa Patriquin at [Melissa.Patriquin@dal.ca](mailto:Melissa.Patriquin@dal.ca). The lead researcher will respond as soon as possible. If your questions have been answered to your satisfaction and you are interested in participating, the lead researcher will email the consent to participate form and the interview questions for you to review before your interview. The interview will take place over the phone at a time that is convenient for the participant. Verbal consent to participate will be obtained at that time.

Melissa Patriquin OT Reg (NS)

Post Professional Masters of Occupational Therapy Student

School of Occupational Therapy, Dalhousie University

## APPENDIX C: INFORMED CONSENT FORM



**Project title:** Investigating current occupational therapy practice and application of evidence based interventions for restricted and repetitive behavior in children with ASD ages 0-18

**Lead researcher:** Melissa Patriquin OT Reg(NS)

Post Professional Master's Program in Occupational Therapy

School of Occupational Therapy, Dalhousie University

[Melissa.Patriquin@dal.ca](mailto:Melissa.Patriquin@dal.ca) / 902-754-5891

### **Other researchers**

Dr. Diane MacKenzie Dalhousie University School of Occupational Therapy

Dr. Joan Versnel Dalhousie University School of Occupational Therapy

**Funding provided by:** Not Applicable

### **Introduction**

We invite you to take part in a research study being conducted at Dalhousie University by Melissa Patriquin OT Reg (NS), as part of the Post Professional Masters in Occupational Therapy program. Choosing whether or not to take part in this research is entirely your choice. The information below tells you about what is involved in the research, what you will be asked to do and about any benefit, risk, inconvenience or

discomfort that you might experience.

You should discuss any questions you have about this study with Melissa Patriquin at [Melissa.Patriquin@dal.ca](mailto:Melissa.Patriquin@dal.ca). Please ask as many questions as you like.

### **Purpose and Outline of the Research Study**

Restricted and Repetitive Behavior (RRB) is a core problematic issue experienced by individuals diagnosed with ASD that often impedes functional behavior. Occupational Therapy's goal is to help clients overcome functional limitations in order to achieve greater independence and success in tasks. Addressing the RRBs experienced by those with ASD is therefore often part of an occupational therapist's treatment plan with this population. Many theories related to the cause of RRBs in ASD exist, resulting in a variety of intervention options available to clinicians.

The purpose of this study is to determine what interventions and/or approaches occupational therapists are using to address this functionally limiting issue. The anticipated outcome of this study is to determine trends in treatment approaches being used by occupational therapists in Canada to address RRBs with individuals diagnosed with ASD (ages 0-18); how are therapists deciding what interventions to use; and what unique perspective do occupational therapists have in relation to function and RRB. It is anticipated that the results from this study will help to guide practice of occupational therapists working with children with ASD experiencing functional issues related to RRBs.

### **Who Can Take Part in the Research Study**

**Study Population:** This study is voluntary. You may participate in this study if you are a Canadian occupational therapist who is working with or has worked (in the past 5 years) with children diagnosed with ASD (ages 0-18), with restricted and repetitive behaviors.

### **What You Will Be Asked to Do**

A semi structured interview format will be used to gather information over the telephone with volunteers interested in participation at a time that is convenient for them. The questions that will be asked during the interview will be sent to each volunteer before the interview. It is anticipated that the interview will take between 30 min and 1 hour to complete and that all data will be collected between August-October 2016.

Interviews may be audio recorded if the participant has consented to do so. If the participant chooses to not have their interview recorded, the lead researcher will take notes as the interview is conducted. Information provided by each participant and collected by this researcher will be sent back to the original participant to review for clarity and accuracy following the interview.

### **Possible Benefits, Risks and Discomforts**

*Potential Risks:* The potential risks for participants associated with this study are low but may include the following: The risk of being identified, the risk of participants experiencing discomfort secondary to sharing or possibly feeling judged for the treatment strategies they have been using in their practice, and also the potential risk of job/registration related consequences if the interventions they report as using/or have used are perceived as harmful or unethical.

Risk related to being identified will be mitigated by assigning identifier codes for each participant and only using that code on transcribed data that will be analyzed by members of the research team. All personal demographic information provided by participants which may include initials, contact information such as phone number and email will only be known to the lead researcher. This information will not be shared.

No names or other identifying information will be used when reporting data in the publication either generally or when using quotes. Any information gathered during interview will be described broadly rather than specifically and will be stored in a secure location that no other person has access to other than the lead researcher. Also, all interviews will be conducted individually by phone so that no participants will be aware of other participants and the information they shared.

The potential risk of discomfort will be addressed by the lead therapist by ensuring non-judgmental, informal language is used throughout the interview process. All questions that are part of the semi structured interview will be made available to participants ahead of time and will be phrased in such a way that participants will not feel judged or critiqued for the methods or interventions utilized. Participants will have the right to only answer questions they want to answer and that they have the right to end the interview at any time should they wish to do so. Information gathered is to be used for research purposes only, to achieve an understanding of interventions being used in the field to address this functional limitation, not to be used for any work related performance issues.

The third potential risk is related to job/registration consequences. The researcher has a duty to report any unsafe or unethical practices that may put clients at risk. All participants need to be made aware of this duty. The duty to disclose is an extreme circumstance in which a therapist is not providing appropriate care to the client. Since interventions reported by therapists are those that they have used personally in their practice that would have been approved by the therapist's employer, licensing board, as well as the parents/caregivers of the children receiving the intervention it is therefore very unlikely that this situation would arise. Participation in this study would not put them at any greater risk for being reported, than if they had not participated in the study.

*Possible Benefits:* There is no known direct benefit to the individual who volunteers to participate in this study. It is hoped that the results of this study will benefit occupational therapists as a group who are working with this population by potentially guiding and optimizing future practice with these clients.

### **Compensation / Reimbursement**

No compensation or reimbursement is being offered for participation in this study.

### **How your information will be protected:**

*Confidentiality:* All personal demographic information provided by participants (which will be minimal and include only email, phone number, initials or first name rather than full name, and years of experience) will only be known to the lead researcher.

All participants will be assigned identifier codes and only that code will be included on transcribed data collected that may be seen by other members of the research team.

*Privacy:* All information gathered will be stored in a secure location on the lead



researcher's computer and phone which are both password protected. Audio information collected over the phone will be transferred to the lead researcher's personal computer following the interview and deleted from the phone at that time. No person, other than the lead researcher will have access to this information.

*Anonymity:* No names or other identifying information will be used when reporting data in the publication either generally or when using quotes. All information gathered will be described broadly, rather than specifically in the final document. All interviews will be conducted individually by phone so that no participants will be aware of the information they have shared.

*Data retention:* All information collected must be stored for up to 5 years following completion of the research. At that time all data will be destroyed. Information that you provide to us will be kept private. Only the lead researcher will have access to this information. We will potentially describe and share our findings in the lead researcher's thesis, presentations, and possibly journal articles. We will be very careful to only talk about group results so that no one will be identified. This means that *you will not be identified in any way in our reports*. Any individuals who work as part of the research team have an obligation to keep all research information private. Also, we will use a participant number (not your name) in our written and computer records so that the information we have about you contains no names. All your identifying information will be securely stored. All electronic records will be kept secure in an encrypted file on the researcher's password-protected computer.

### **If You Decide to Stop Participating**

This study is voluntary. You are free to leave the study at any time up until two

weeks after the completion of your interview. At that time, it will be impossible to remove your data due to the analysis process. If you decide to stop participating, you can also decide whether you want any of the information that you have contributed up to that point to be removed or if you will allow us to use that information. If you do wish to withdraw you may do so by writing the lead researcher at the same email initial contact was made.

### **How to Obtain Results**

We will provide you with a short description of group results when the study is finished. You will be given the opportunity to consent to sending a summary of the study results during the interview. No individual results will be provided.

### **Questions**

We are happy to talk with you about any questions or concerns you may have about your participation in this research study. Please contact Melissa Patriquin OT Reg(NS) at [Melissa.Patriquin@dal.ca](mailto:Melissa.Patriquin@dal.ca) or 902-754-5891 at any time with questions, comments, or concerns about the research study (if you are calling long distance, please call collect). We will also tell you if any new information comes up that could affect your decision to participate.

If you have any ethical concerns about your participation in this research, you may also contact Catherine Connors, Director of Human Research Ethics Administration, Dalhousie University at (902) 494-1462, or email: [ethics@dal.ca](mailto:ethics@dal.ca) (REB file # 2016-3932)

## APPENDIX D: INTERVIEW QUESTIONS



**Project title:** Investigating current occupational therapy practice and application of evidence based interventions for restricted and repetitive behavior in children with ASD

**Lead researcher:** Melissa Patriquin OT Reg (NS)

Post Professional Masters Program in Occupational Therapy

School of Occupational Therapy, Dalhousie University

Melissa.Patriquin@dal.ca /902-754-5891

### **Other researchers**

Dr. Diane MacKenzie, Dalhousie University

Dr. Joan Versnel, Dalhousie University

### **Interview Questions (with probes)**

1. How long have you been working with children diagnosed with ASD?
2. Do you feel RRBs are an impairment experienced by children diagnosed with ASD that should be /are addressed by an occupational therapist?
  - a. Why or Why not?
3. In your practice, have you addressed RRBs with your clients diagnosed with ASD as part of your intervention?
  - a. Why or Why not?

4. What types of RRBs have you addressed in practice? Describe what the RRB looked like.
  - a. Are the RRBs physical in nature (motoric repetitive behaviors)
  - b. Are the RRBs repetitive or restricted thoughts or ideas?
5. When addressing RRBs in practice, what approaches have you taken or considered to address this concern?
  - a. What approaches used for motoric RRBs?
  - b. What approaches used for cognitive RRBs (repetitive thoughts or interests)
6. What clinical reasoning did you use when making decisions around your treatment plan for children experiencing these issues?
7. How has your treatment plans typically involved addressing
  - a. The client's personal skills and abilities
  - b. Modification of the environment
  - c. Teaching/training others in how to react to or handle the behavior?
8. In your experience do you feel there is enough information available to you as an occupational therapist regarding how to address these types of limitations with this population?
  - a. What supports/resources do you access or use to help guide your practice decisions in regards to this issue?
  - b. What is missing related to practice guidance/information about this topic?

## APPENDIX E: VERBAL CONSENT FORM



**Project Title:** Investigating current occupational therapy practice and application of evidence based interventions for restricted and repetitive behavior in children with ASD ages 0-18

**Lead Researcher:** Melissa Patriquin OT Reg(NS) [Melissa.Patriquin@dal.ca](mailto:Melissa.Patriquin@dal.ca)/ 902-754-5891

*The lead investigator (MP) will read the Phone Script and confirm consent or withdrawal from participating:*

MP: Hello <participant's name>, my name is Melissa Patriquin and I am calling to confirm your consent for participation in a research study investigating restrictive and repetitive behaviors in children with ASD. I sent you the **Informed Consent Form** to review in an email last week. I am now going to go through a series of questions to confirm your verbal consent prior to your participation in the research interview.

Have you read the consent form that I sent you and so you agree to participate in this study?

YES       NO

[IF NO] Do you need me to re-send the consent letter or would you like to withdraw?

[IF YES] MP arrangements for follow-up and re-does entire script

[IF NO] RA confirms withdrawal from focus group participation – thank you.

Do you agree that your interview may be audio-recorded?

YES       NO

Do you agree to the use of anonymous quotations in any presentation or publication from the research study?

YES       NO

Do you agree to be contacted by the researchers about related research projects in the future?

YES       NO

Would you like to receive a summary of the results?

YES       NO

Email address: \_\_\_\_\_

Post address: \_\_\_\_\_

Please review the **Informed Consent Form** for more information on how you can learn more about the project, either now, or after you have participated. Also, if you have any concerns about your participation, you may contact the Human Research Ethics Administration at Dalhousie. All contact information can be found in the consent form

that was sent by email.

Do you have any further questions before we proceed with the interview?

---

Participant Name

Date