

Functional Analysis and Treatment of OCD-related Behaviour  
In a Child with Autism Spectrum Disorder

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## Abstract

Research indicates that Obsessive-Compulsive Disorder (OCD; DSM-IV-TR, American Psychiatric Association, 2000) is the second most frequent disorder to coincide with Autism Spectrum Disorder (ASD; Leyfer et al., 2006). Excessive collecting and hoarding are also frequently reported in children with ASD (Berjerot, 2007). Although functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) has successfully identified maintaining variables for repetitive behaviours such as of bizarre vocalizations (e.g., Wilder, Masuda, O'Connor, & Baham, 2001), tics (e.g., Scotti, Schulman, & Hojnacki, 1994), and habit disorders (e.g., Woods & Miltenberger, 1996), extant literature of OCD and functional analysis methodology is scarce (May et al., 2008). The current studies utilized functional analysis methodology to identify the types of operant functions associated with the OCD-related hoarding behaviour of a child with ASD and examined the efficacy of function-based intervention. Results supported hypotheses of automatic and socially mediated positive reinforcement. A corresponding function-based treatment plan incorporated antecedent strategies and differential reinforcement (Deitz, 1977; Lindberg, Iwata, Kahng, and DeLeon, 1999; Reynolds, 1961). Reductions in problem behaviour were evidenced through use of a multiple baseline across behaviours design and maintained during two-month follow-up. Decreases in symptom severity were also discerned through subjective measures of treatment effectiveness.

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Functional Analysis and Treatment of OCD-Related Behaviour in a Child  
with Autism Spectrum Disorder

Emphasizing socially important targets is an essential feature of Applied Behaviour Analysis (ABA). According to Baer, Wolfe, and Risley (1968), target behaviours should be chosen: “because of their importance to man and society, rather than their importance to theory” (p. 92). However, while use of ABA principles and procedures has proven beneficial for several specific populations and target behaviors (e.g., self-injury of individuals with developmental disabilities, teaching language and social skills to children with Autism Spectrum Disorder), the field of ABA has paid rather minimal attention to problems regularly addressed within clinical psychology (Woods, Miltenberger, & Carr, 2006). A resulting overreliance on a structurally based system of diagnostic categorization by both the general populace and clinical psychologists has precluded the application of empirically validated procedures to an unlimited number of human behaviours, such as those categorized as Obsessive-compulsive disorder (OCD; DSM-IV-TR, American Psychiatric Association: APA, 2000).

In his seminal paper, Carr (1977) suggested that different types of reinforcement might be responsible for the occurrence of self-injurious behaviour. Since that time, behaviour analytic research has indicated that conducting functional analysis (i.e., analogue or experimental analysis) of aberrant behaviour, akin to the work of Iwata, Dorsey, Slifer, Bauman, and Richman, (1982/1994), is indeed an integral component in understanding the response-reinforcer relation and creating subsequent effective interventions. It has been demonstrated that treatments created without an understanding of behavioural functions, are inclined to reveal unreliable results (Iwata et al., 2000). Although function-based treatments have proven effective for a variety of behaviour disorders (e.g., Fisher, Piazza, & Page, 1989; Iwata et al., 1994b; Mace & Lalli, 1991;



Piazza et al., 1997; Piazza, Hanley, & Fisher, 1996; Thompson, Fisher, Piazza, & Kuhn, 1998; Vollmer, Northrup, Ringdahl, LeBlanc, & Chauvin, 1996), environmental variables potentially contributing to the development and maintenance of OCD behaviours have not been studied extensively even though these behaviours are typically explained as being maintained by tension reduction (negative reinforcement) (Caldwell, 2005). Likewise, we posit that experimental analyses are often erroneously substituted with less accurate descriptive and indirect analyses in clinical practice (Lerman & Iwata, 1993; Mace & Lalli, 1991; Piazza et al., 2003). Consequently, the present studies empirically tested possible maintaining consequences in determining effective ABA procedures to be incorporated in the treatment of OCD behaviour.

### **Obsessive-Compulsive Disorder**

Obsessive-compulsive disorder is an anxiety disorder characterized by recurring obsessions and /or compulsions that cause marked distress and/or interference in one's life (*DSM-IV-TR*, APA, 2000). The International Classification of Diseases (ICD-10; World Health Organization, 2007) specifies three subtypes of the disorder: OCD with predominantly obsessions, with predominantly compulsions, or with mixed obsessions and compulsions. Distinct from normal fastidiousness and interests, the persistence of obsessions becomes exceedingly troublesome until actions are taken to alleviate distress. Compulsions are defined as repetitive behaviours or rituals that the individual feels forced to carry out to diminish feelings of anxiety or to conform to rigid, yet illogical, rules. Although conducting the compulsive behaviour eases tension, relief is transitory with reoccurring thoughts necessitating repeated compulsive acts (Caldwell, 2005). Recent debate about the classification of OCD as an anxiety disorder has resulted in the term 'OC spectrum' being used to encompass similarities between

OCD and a variety of other disorders such as trichotillomania, tic disorders, and autism (see Bartz & Hollander, 2006 for a recent review of this issue; Ivarsson & Melin 2008).

### **Hoarding**

Compulsive hoarding refers to “the acquisition of, and failure to discard, possessions which appear to be useless or of limited value” (Frost & Gross, 1993). Characterized by the acquisition and failure to discard a large number of possessions, clutter that precludes activities for which living spaces were designed, and significant distress or impairment in functioning (Frost & Hartl, 1996), compulsive hoarding is a relatively common symptom of obsessive-compulsive disorder with 15% to 40% of OCD patients reporting hoarding compulsions (Frost, Krause, & Steketee, 1996; Pertusa et al., 2008). Recent research also indicates that hoarding symptoms are particularly dominant in young girls (Mataix-Cols, Nakatani, Micali, & Heyman, 2008) and that patients with hoarding symptoms have more severe OCD than those without hoarding behaviours (Samuels et al., 2002). Conversely, a substantial number of those with hoarding behaviours display no other OCD symptoms (Abramowitz, Wheaton, & Stork, 2008). There is also evidence that hoarding is often resistive to treatments which are effective for OCD such as selective serotonin reuptake inhibitors (SSRIs) or cognitive behavioral therapy (CBT) (Mataix-Cols, Marks, Greist, Kobak, & Baer, 2002; Abramowitz, Franklin, Schwartz, & Furr, 2003; Steketee & Frost, 2003). As a result, the exact nosology of hoarding remains unclear and research continues to be conducted which may impact whether hoarding continues to be classified as OCD in the revised 5<sup>th</sup> edition of the DSM (Pertusa et al., 2008).

### **Autism Spectrum Disorder**

Autism Spectrum Disorders (ASD), including autism, Asperger's syndrome, and pervasive development disorder-not otherwise specified, are characterized by significant

impairments in social interaction, communication, and the presence of repetitive and/or restrictive behaviours (*DSM-IV-TR*, APA, 2000). Similarities among the repetitive routines and rituals frequent in ASD have led to the determination that individuals with ASD often have comorbid OCD (Russell, Mataix-Cols, Anson, & Murphy, 2005; Zandt, Prior, & Kyrios, 2007). In fact, recent investigations by Leyfer et al. (2006), which allowed for diagnosis of OCD based on signs and symptoms that could be observed by others, concluded that 37% of children with ASD meet DSM-IV criteria for OCD. Excessive collecting and hoarding of objects is also commonly reported in adults (McDougle et al., 1995) and children (Berjerot, 2007) with ASD. As Fischer-Terworth and Probst (2009) point out “the collecting passion of autistic individuals can convert into OCD-specific hoarding compulsions, when collecting and hoarding is associated with distress for the individual and/or the family members...fascination and anxiety can also be entangled in regard to obsessional interests” (p.14).

### **ASD and OCD**

Diagnostic differentiation among the ASD and OCD is often obscured by children’s communication impairments, emotion recognition deficits (Leyfer et al., 2006), and the propensity for intellectual disability to coexist with ASD (26% to 80% of individuals; Lord and Volkmar, 2002). While the *DSM-IV-TR* (APA, 2000) denotes that the distressing symptoms of OCD are distinct from the circumscribed enjoyable interests common in ASD (South, Ozonoff, & McMahon, 2005; Zandt, Prior, & Kyrios, 2009), this supposition has yet to be experimentally corroborated as “current functional analysis methodologies are not adequate to identify automatic negative reinforcement” (Miltenberger, 2005, p.2). Such limitations and ambiguities have led to the suggestion that OCD with comorbid ASD should be acknowledged as a

legitimate OCD subtype (similar to OCD with comorbid tics; Berjerot, 2007). At the present time, however, differentiation among ASD and OCD symptoms continues to be problematic.

While preliminary research involving use of Cognitive Behaviour Therapy (CBT) in the treatment of OCD for people with co-morbid ASD diagnoses has shown promise (Chalfant, Rapee & Carroll, 2007; Lehmkuhl, Storch, Bodfish, & Geffen, 2008; Martin & Thienemann, 2005; McCambridge, Vause, & Feldman, 2009; Reaven & Hepburn, 2003; Sigafos, Green, Payne, O'Reilly, & Lancioni, 2009; Sofronoff, Attwood & Hinton, 2005; Sze and Wood, 2007; Wood et al., 2009; Vause, Grubb, & Feldman, 2008), research of alternative interventions based on enhanced analogue assessment has not been incorporated in extant literature. Additionally, hoarding appears resistant to existing treatments (Abramowitz et al., 2003; Marks et al., 2002; Mataix-Cols et al., 2002; Steketee & Frost, 2003) and investigations of assessment and treatment methods for hoarding in persons with ASD specifically are non-existent. Recognizing these omissions, the present research evaluated the use of comprehensive functional assessment and analysis methodologies in identifying operant functions.

### **Functional Analysis**

Functional analysis, a part of functional behaviour assessment also referred to as analogue or experimental analysis, is used to determine the purposes (functions) of problem behaviour and to identify influential establishing operations (EO; Michael, 1982) and discriminative stimuli ( $S^D$ ; Iwata et al., 1982/1994). It involves utilizing an experimental design to arrange antecedents, consequences, or both, representative of the person's natural environment/ routines, observation, and measurement to determine the separate effects of presented conditions. Following this process of analysis, treatments can be developed in which the maintaining reinforcer is delivered differentially or noncontingently and withheld following

problem behavior (i.e., extinction; EXT; Skinner, 1953). Although the functional relationships between behaviour and specific environmental events are uniquely selected and manipulated for each individual, the general process of functional analysis is often modeled after Iwata et al. (1982/ 1994) , who evaluated the operant functions of self-injurious behaviour (SIB). By repeatedly exposing nine subjects with developmental disabilities to a series of brief analogue conditions, Iwata et al. revealed SIB to be consistently associated with particular social and/or physical environment conditions for six of the nine participants. The remaining three subjects showed either undifferentiated patterns or high levels of self-injury across conditions suggesting that SIB may have served multiple functions, may have been a function of variables that were not presented, or that different conditions were not clearly discernable. Even so, this study clearly demonstrates that operant methodology can be used to assess functional relationships between atypical behaviour and specific environmental events.

Despite on-going empirical evidence supporting the usefulness of functional analyses (e.g., Hanley, Iwata, & McCord, 2003; Iwata, et al., 1994b; Mace & Lalli, 1991; Piazza et al., 1996; Piazza et al., 1997; Thompson et al., 1998; Vollmer et al., 1996), many researchers and practitioners continue to select treatment for OCD based on structure or name alone. Although the use of prescriptive approaches such as CBT have proven to be highly efficacious with children and youth (Watson & Rees, 2008), a generic method of treatment selection is cautioned. As Thyer (1997) and Wolpe (Poppen, 1995) indicate, the use of standardized protocols to treat *diagnostic categories* as opposed to individual behaviours is incompatible with (or at least incomplete) behavior analysis, threatens the external validity of research findings, and encourages ineffective or counterproductive treatment procedures. The application of functional analysis methodologies in the presented research augments scant extant literature of operant

elements potentially maintaining OCD behaviours and reveals advantageous, individualized, function-based treatment options. Minimally, this research fulfills an inherent right of persons receiving treatment designed to change their behaviour; namely the right to behavioural assessment and the right to effective and scientifically validated treatment (Van Houten et al., 1988).

### **Associated Research**

#### **Functional Analysis of Bizarre Speech**

Some researchers have extended the use of functional analysis procedures to clinical issues which are generally absent from ABA literature. For example, three studies have used functional analysis to investigate the variables resulting in bizarre vocalizations emitted by individuals with concurrent mental health diagnoses such as schizophrenia, bi-polar disorder, and mental retardation diagnoses (Lancaster et al., 1994; Mace, Webb, Sharkey, Mattson, & Rosen, 1988; Wilder, Masuda, O'Connor, & Baham, 2001). In doing so, these researchers moved beyond a mere theoretical view that bizarre vocalizations are a class of operants controlled by social consequences (Ayllon & Michael, 1959; Green, Linsk, & Pinkston, 1986; Liberman, Teigen, Patterson, & Baker, 1973; Wong, Terranova, Bowen, Zarate, Massel & Liberman, 1987).

Mace et al. (1988) were the first to apply functional analysis methodology to investigate the relationship between bizarre speech and environmental contingencies. In testing hypotheses of social functions derived from indirect measures, these researchers alternated three conditions including a *demand* condition, a *group* condition (designed to replicate natural events when the focus of others is divided resulting in the subject competing for attention), and a *one-to-one attention* condition. Results of experimental manipulations revealed bizarre vocalizations associated with escape from task demand and removal of attention most commonly in the group

format. Significant reductions in aberrant speech occurred through the use of guided compliance and ignoring plus contingent attention as demonstrated via a reversal design.

Similarly, Wilder et al. (2001) utilized a brief functional analysis to identify consequences responsible for the maintenance of the bizarre vocalizations of a 43-year-old male diagnosed with chronic undifferentiated schizophrenia and personality disorder not otherwise specified. In randomly alternating four functional analysis conditions in a multielement design (*alone, demand, control, and attention*), these researchers identified bizarre vocalizations to be responsive to contingent attention. Treatment involving differential reinforcement of appropriate vocalizations and extinction (withholding attention for inappropriate vocalizations) further validated these results as substantial decreases in bizarre vocalizations and increases in appropriate vocalizations occurred each time intervention was implemented in a reversal design.

Finally, working under the hypothesis that a selection bias exists in behaviour analytic literature (that behavioural researchers are referred cases with obvious social consequences while other cases are predominantly referred to medical professionals), Lancaster et al. (2004) examined use of functional analysis procedures and noncontingent reinforcement with the bizarre vocalizations of four dually diagnosed individuals (i.e., concurrent mental health and mental retardation diagnoses). Conditions presented included demand, social attention, alone, tangible, control, and an alternative control condition involving constant attention. Results indicated that attention maintained the problem behaviour for two of the four participants and subsequent use of noncontingent reinforcement (attention) with those specific individuals effectively reduced bizarre vocalizations. Additionally, notions of a referral bias were eradicated.

Results of these studies suggest that abnormal vocalizations displayed by some individuals with mental health concerns may be maintained by, or are at least sensitive to, social consequences rather than hypothetical mental processes. Furthermore, these studies demonstrate that treatment derived from functional analysis results can lead to the development of effective interventions.

### **Functional Analysis of Tic and Habit Behaviours**

Utilizations of functional analysis procedures within clinical psychology are present in research of tics (Woods et al., 2006). For example, Scotti, Schulman, and Hojnacki (1994) used indirect assessment and functional analysis procedures to assess the head and vocal tics of a 32-year old male with both Tourette's syndrome and profound mental retardation. Both the Motivation Assessment Scale (MAS; Durand & Crimmins, 1988) and a functional analysis (using five conditions: *task/escape*, *social approval*, *social disapproval*, *alone*, and *control*), revealed that tic behaviours were primarily a consequence of escape from task demand. A resulting treatment plan based on these results, however, failed to produce desired changes in behaviour.

Likewise, Carr, Taylor, Wallander and Reiss (1996) conducted a functional analysis within a classroom setting to aid in the diagnosis of multiple vocal tic-like behaviours exhibited by an eleven year old male. Results of their assessment revealed vocalizations to be more prevalent in *attention* and *escape* conditions and supported a diagnosis of a temporary tic disorder affected by operant variables.

Finally, Watson and Sterling (1998) instructed parents on how to conduct a functional analysis of a young girl's vocal tic behaviour and revealed that the tic-like behaviour was contingent upon parental attention. The implementation of a resulting treatment plan that



included extinction (withholding attention when the child coughed) and differential reinforcement of other behavior (DRO; Reynolds, 1961; providing verbal statements contingent upon no coughing) resulted in zero occurrences of the target behaviour at six-month follow-up.

Research isolating maintaining variables for habit behaviours has also been conducted. For example, Rapp, Dozier, Carr, Patel, and Enloe (2000) used functional analysis to evaluate hair pulling in a four-year old male diagnosed with autism and concluded that high levels of behaviour occurring predominately during an *alone* condition were suggestive of a self-stimulatory function. Replicating previous research (Rapp et al., 1999), Rapp et al. subsequently used gloves to assess hair manipulation when digital-tactile stimulation was attenuated. A final phase of this research involved use of a preference assessment to determine if hair manipulation would occur when other favorable items were available.

Although limited, manipulations of antecedent (Woods & Miltenberger, 1996) and consequent events (Miltenberger et al., 1998) have been conducted in an endeavor to identify the specific impact of *anxiety* on the occurrence of habit behaviours. In 1996, Woods and Miltenberger exposed 44 typically developing people to three conditions (*anxiety*, *bored*, and *neutral*) and scored the occurrence of habit behaviours (e.g., hair, face, and object manipulation). In the *anxiety* condition, the participants were told they would be doing a short presentation to a group of peers on an article they were to briefly review. In the *bored* condition, the participants were asked to sit and do nothing for twelve minutes. The *neutral* condition involved viewing an entertaining video for ten minutes. After each condition, the participants completed a five-item 9-point Likert-type questionnaire and a ten second partial-interval method was used to document the occurrence of target behaviours. Results suggested that habit behaviors may serve an anxiety

reduction or self-stimulatory function, with hair and face manipulation occurring most often in the *anxiety* condition and object manipulation occurring most often in the *bored* condition.

Miltenberger et al. (1998) also assessed the influence of anxiety on the hair pulling behaviour of a young girl by including a *demand* condition designed to induce anxiety or other emotional responses (academic demand without contingent escape). While this study surmised that the function of hair pulling might be analyzed via functional analysis methods, inconsistency with indirect assessment was revealed. In contrast to parent reports indicating that hair pulling occurred more frequently during stressful events (i.e., was anxiety related), experimentation revealed that problem behaviour was four times more likely to occur in an *alone* condition than in an '*anxiety*' condition (i.e., the role of anxiety was overestimated). Explanations for such incongruent results are discussed in Miltenberger (2005) on the role of automatic negative reinforcement in clinical problems; automatic negative consequences cannot be manipulated or accurately measured via functional analysis due to ethical and practical concerns, thus a reliance these measures (e.g., Lee & Miltenberger, 1997).

### **Applied Behaviour Analysis and OCD**

Woods, Miltenberger, and Carr (2006) point out that to the field of behaviour analysis has primarily concentrated on behaviours displayed by individuals with developmental disabilities and that ABA research has to some extent neglected common clinical problems (e.g., anxiety disorders, psychotic disorders, substance abuse, ADHD, obesity, etc.). This appraisal is partly corroborated by the scant study of OCD and hoarding within the field. To date, only one study has incorporated ABA methodology in its manipulation of environmental variables to treat hoarding behaviour. After having first hypothesized function through use of descriptive analyses, Allyon and Michael (1959) used a combination of extinction for social attention and

stimulus satiation (e.g., filling the environment with commonly saved paper products) to effectively reduce the hoarding behaviour of four males with severe intellectual disability. Use of a behaviour analytic approach in the treatment of hoarding has not been reported over the five decades that have elapsed since this classic research.

Likewise, a single published study has utilized experimental manipulations of antecedent and consequent events to explore operant functions of OCD behaviours. In 2008, May et al. used a multielement design to assess the obsessive-compulsive verbalizations in a patient dually diagnosed with OCD and intellectual disability. Through manipulating four conditions (*positive* and *negative reinforcement*, and *positive* and *negative punishment*), they determined that OCD behaviours were maintained by socially mediated negative reinforcement (i.e., escape from demands). Despite such findings however, treatment was incongruously void of behavioural components, with the effects of medication being assessed as an alternative.

These preliminary studies demonstrate that it may be unnecessary to pathologize behaviours that can be identified as being controlled by social or environmental events. Additionally, this line of research exhibits that the application of functional analysis methodology permits accurate inference about the functions of specific behaviours, thereby facilitating the development of efficacious individualized treatments (Woods & Miltenberger, 1996).

### **Functional Assessment of OCD and ASD**

Some research incorporating a consideration of operant functions of OCD-related behaviours in children with ASD has shown promising results (McCambridge et al., 2009; Sigafos et al., 2009; Vause et al., 2008). For example, Sigafos et al. utilized direct observations during their pretreatment assessment of compulsive object rearrangement behaviour

displayed by an adolescent male with autism. Results of their assessment indicated that such behaviour might have been maintained by automatic reinforcement (as target behaviours occurred during periods of non-interaction with others), social negative reinforcement (as school staff typically left the boy alone when rearranging was displayed), or both. A corresponding treatment plan was then implemented which attempted to reduce obsessive-repetitive behaviour by increasing sensory stimulation and facilitating staff interaction by increasing engagement in appropriate activities. While Sigafos et al. omitted use of an analogue assessment, their acknowledgment of a possible social function may have contributed to the success of intervention. In pairing enjoyable leisure activities with social interaction an establishing operation for social negative reinforcement may have been abolished and associated rearranging behaviours consequently abated.

Vause et al. (2008) and McCambridge et al. (2009) also included a consideration of behaviour function in their assessment and treatment of children dually diagnosed with High Functioning Autism (HFA; individuals who have an IQ above 69 and are verbally fluent; Thede & Coolidge, 2007) and OCD. Using an altered version of the Questions About Behavioral Function (QABF; Matson & Vollmer, 1995) which incorporated 'anxiety' specific questions, these researchers hypothesized that social variables (in addition to physical discomfort) potentially contributed to the occurrence of OCD behaviours. The implementation of a modified version of the March and Mulle (1998) CBT treatment package, which included function related elements, effectively reduced OCD behaviours for all participants and treatment benefits were maintained at follow-up.

Our presented research extends upon this literature involving treatment of this heterogeneous population. Most notably, our incorporation of an experimental functional

analysis permitted empirical validation for a hypothesis of social maintaining variables for OCD behaviour. This addition facilitated use of empirically validated behavioural procedures including extinction and differential reinforcement. In doing so, our function-based approach provided an alternative treatment option to CBT for an individual with ASD not falling within the category of high functioning. We consider this to be a significant contribution as the linguistic, cognitive, and social characteristics of ASD may render standard CBT elements (i.e., cognitive restructuring and exposure and response prevention) less effective even when individualized modifications are made (Wood et al., 2009).

### **Purpose of Current Research**

The main purpose of this research was to investigate the efficacy of functional analysis in identifying operant functions of OCD-related behaviours displayed by a child with ASD. An equally important rationale was to determine if a function-based treatment plan would effectively reduce OCD-related behaviours, to establish if symptom severity would be associated with changes in parenting stress, quality of life, and consumer satisfaction, and to investigate if realized treatment benefits would be maintained during two-month follow-up. By extending the use of functional analysis methodology to additional socially important behaviours, we also endeavored to expand upon existing clinical behaviour analytic research. A final purpose was to determine if maintaining functions identified by the QABF (Matson & Vollmer, 1995) would correspond with those identified via functional analysis.

## Method

### Participant

**Diagnostic formulation.** One 12-year old female, Rachel (pseudonym), was selected to take part in this study. Upon entry, Rachel had a diagnosis of Autism from two independent professionals (i.e., developmental pediatrician and clinical psychologist).

In addition to other diagnoses (e.g., Attention Deficit Hyperactivity Disorder, Developmental Disability), both professionals also acknowledged the presence of anxiety and OCD symptoms (one giving a formal diagnosis of OCD). An independent examiner (graduate student) also confirmed that Rachel met diagnostic criteria for OCD using the OCD module of the Anxiety Disorder Interview Schedule (Silverman & Albano, 1996). Pre-treatment results of the Children's Yale Brown Obsessive-compulsive Scale (CY-BOCS; Goodman, Rasmussen, Price, & Rapoport, 1986) indicated that Rachel fell within the high-moderate range of OCD with a total score of 23. Identified obsessions included thoughts of hoarding, worries about losing things, and concerns with bodily waste. Identified compulsions included hoarding, engagement in extensive packing of items before leaving her home, and adhering to a regimented bedtime routine.

The Child Obsessive-Compulsive Impact Scale-Revised (COIS-RP; Piacentini, Peris, Bergman, Chang, & Jaffer, 2007) was also used as a measure of OCD severity and treatment efficacy. An initial COIS-RP score of 25 indicated that OC symptoms caused moderated problems with family life/activities and social interactions. Rachel's behaviours reportedly did not significantly impact her participation at school. These results are in keeping with Piacentini, Bergman, Keller, and McCracken's (2003) research identifying that almost 90% of youngsters report at least one significant OCD- related dysfunction.

Administration of the Wechsler Intelligence Scale for Children – Fourth Edition Short Form (WISC-IV; Wechsler, 2003) revealed that Rachel fell within the extremely low range of overall intellectual ability. Similarly, results of the Vineland Adaptive Behavioral Scales II (Vineland- II; Sparrow, Cicchetti & Balla, 2005) indicated that Rachel fell within the extremely low range on all scored domains: communication, daily living skills, and socialization.

**Additional descriptive information.** Initial independent observations determined that Rachel was agreeable, good at pre-occupying herself, and responded correctly to very simple directions. However, Rachel reportedly displayed limited verbal capacity, had difficulty understanding multiple-step instructions, and showed lack of focus. Although she communicated vocally, it was rather difficult to understand Rachel's speech as she spoke quickly and quietly with her head turned away. Throughout the course of the study, however, it became easier to decipher what Rachel was saying and she appeared increasingly tolerant of our presence as we became more familiar to each other.

During regular discussions with the primary researcher, Rachel's mother revealed that Rachel historically found it difficult to interact with children her own age and that she often played with much younger children. Additionally, her mother indicated that several events usually resulted in emotional outbursts from Rachel including getting her feet wet, abrupt changes to schedules and watching other people eat certain foods (e.g., grapes or condiments). Rachel's mother conveyed that while her daughter's repetitive behaviours had been displayed for several years, recent increases in the frequency and intensity of hoarding had become a major concern for the family. While no formal interventions had been previously implemented that targeted the presenting complaint, her mother described on-going futile attempts to eliminate the behaviours (e.g., scolding, rationalizing). Rachel's mother hypothesized that OCD-related

behaviours occurred because Rachel liked to please other people (i.e., always wanting to have the *right* toys with her in case someone wants something; collecting papers that others may find useful) and that she enjoys the behaviours. Rachel's prescribed medication regimen, consisting of Adderall (10 mg a day) to treat symptoms of ADHD, remained consistent throughout the duration of the study.

### **Ethical Considerations**

Written, informed consent was obtained from the participant's parent at the onset of this research. Assent from the participant was also obtained. A comprehensive, non-technical verbal and written explanation of this study was also given to both the parent and the child before intervention began. The family was informed that participation was voluntary, that the participant's name would remain undisclosed, and that treatment results and responses to questionnaires would be used for research purposes only. Consent/assent was given to videotape to ensure treatment integrity, for purposes of data collection, and to show clips for educational purposes at talks and conferences for parents, students, and professionals. Finally, the parent received copies of all signed consent forms (parent) and assent forms (child) (Appendix A).

### **Materials**

#### **Cognitive assessment measures.**

#### ***Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV Short Forms).***

The WISC-IV (Wechsler, 2003) is a clinical tool used to evaluate the cognitive aptitude of children aged 6 years to 16 years 11 months. As lengthy administration of the full WISC-IV may correspond to problem behaviours in children with autism such as escape behaviours or self-stimulation, short forms of the scales provide an alternative for use in research studies and preliminary screenings (Silverstein, 1990). Evaluations of the short forms have concluded good



predictive accuracy in individuals with high functioning autism, with the percentages of explained variance in the .8–.9 range for all analyses (Minschew, Turner, & Goldstein, 2005). The four subscales of the WISC-IV used in this research to result in a Full Scale Intelligence Quotient (FSIQ) include: block design, similarities, digital span, and coding.

***Vineland Adaptive Behavior Scales (Vineland- II)***. The Vineland-II (Sparrow, Cicchetti, & Balla, 2005) is designed to assess the personal and social functioning of people from birth to 18 years of age with and without disabilities. It is comprised of four behaviour domains and 11 sub domains that can be completed by a primary caregiver (Parent/Caregiver Rating Form). Investigation of reliability reveals moderate internal consistency for the total Vineland and for most all separate sub domains (Sparrow et al., 2005).

#### **OCD assessment measures.**

***Anxiety Disorders Interview Schedule – Parent Interview Schedules (ADIS-P)***. The ADIS-P (Silverman & Albano, 1996) is a semi-structured interview arranged diagnostically to allow for differentiation between all *DSM-IV-TR* (APA, 2000) anxiety disorders. For the purpose of this study, only the OCD module was administered. Research finds support for the use of the ADIS-P in anxiety diagnosis with sound psychometric properties (Silverman, Saavedra, & Pina, 2001; Wood, Piacentini, Bergman, McCracken, & Barrios, 2002).

***Children’s Yale Brown Obsessive-compulsive Scale (CY-BOCS)***. The CY-BOCS (Goodman et al., 1986) is a 10-item semi-structured interview for children aged 6-17 that concurrently measures the frequency and intensity of OCD while establishing a list of symptoms which were most troublesome. Evaluation of time consumed, distress, interference, degree of resistance, and control, results in a total severity score: 0 to 7 = *subclinical*, 8 to 15 = *mild*, 16 to 23 = *moderate*, 24 to 31 = *severe*, and 32 to 40 = *extreme*. The CY-BOCS has been shown to

possess favorable psychometric characteristics (Scahill et al., 1997; Storch et al., 2004 ; ) and has resultantly become one of the most frequently used measures of obsessive–compulsive symptom severity in children (McKay et al., 2003). Used as a subjective measure of treatment effectiveness, the CY-BOCS was administered pre- and post-treatment in this research. It should be noted that child and parental responses were not integrated in our use of the scale. While initial attempts were made to include child reports of OCD, Rachel’s comorbid ASD diagnosis and level of cognitive functioning prevented accurate responding, thus we relied solely on parent data. See Appendix B for a copy of the CY-BOCS.

***Child Obsessive-Compulsive Impact Scale-Revised (COIS-R - parent report)***. The COIS-R (Piacentini et al., 2007) parent report is a measure of OCD functional impairment with good internal consistency, concurrent validity, and test–retest reliability (Piacentini et al.) Thirty-three questions on the COIS-R parent report assess the degree to which unwanted thoughts and/or rituals cause impairments in daily living skills, school, social, and family/activities during one month using a 4 point Likert scale (0 = *not at all*; 3 = *very much*). The COIS-RP was used in this research for the purposes of assessing OCD severity and to investigate treatment effectiveness (see Appendix C).

**Functional assessment measure.**

***Questions About Behavioral Function (QABF)***. The QABF (Matson & Vollmer, 1995) is an extensively used 25-item rating scale developed to identify the function(s) of maladaptive behaviour in individuals with developmental disabilities. Results of the QABF provide a picture of what the informant says motivates the child’s behaviour by rating how often target behaviour(s) occur (0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*) associated with each of five functions of behaviour including: (a) attention, (b) escape, (c) non-social, (d) physical, and (e)

tangible. Having demonstrated acceptable psychometric data (Freeman, Walker, & Kaufman, 2007; Matson, Bamberg, Cherry, & Paclawskyj, 1999; Paclawskyj, Matson, Rush, Smalls, & Vollmer, 2000), the QABF was used as an indirect assessment and as a preliminary guide to assist in the development of experimental conditions in this research. The QABF was independently completed by Rachel's mother and the primary researcher. Functions associated with problem behaviour were represented by both the highest total ratings and the highest number of items endorsed. A copy of the QABF can be found in Appendix D.

### **Secondary outcome measures.**

***Parenting Stress Index Short Form (PSI-SF).*** The PSI-SF (Abidin, 1995) is a self-report measure of parenting stress that uses a 5-point scale to indicate the degree to which parents agree with each of the 36 presented items. Results of three subscales yield a total stress score with information relating to parental distress, dysfunctional parent-child interaction, and difficult child. Investigations of psychometric integrity have revealed strong validity and test-retest stability for the PSI-SF (Haskett, Ahern, Ward, & Allaire, 2006). The PSI-SF was used pre-and-post intervention to measure changes in the degree of stress in the parent-child relationship.

***Quality of Life Questionnaire.*** Treatment effectiveness with respect to family quality of life was measured via the Quality of Life Questionnaire (Feldman, Condillac, Tough, Hunt, & Griffiths, 2002). A parent was asked to rate the extent to which OCD-related behaviours contributed to problems with daily activities prior to and upon completion of treatment using this 7-point Likert scale. With scores ranging from 1 (*minimally*) to 7 (*extremely*), a higher score indicates greater disruption to quality of life associated with the participant's identified problem behaviour(s) (see Appendix E).

***Consumer Satisfaction Questionnaire.*** Participant acceptance and satisfaction with the provided treatment was assessed upon completion of this research using the Consumer Satisfaction Scale (Feldman et al., 2002). Using a 7-point Likert scale, this self-report tool provides a measure of a consumer's perceived satisfaction, level of involvement, and treatment effectiveness (see Appendix F).

### **Response Measurement**

Although parent reports indicated that Rachel had obsessive thoughts, only overt compulsive behaviours were targeted for assessment and treatment in an attempt to collect accurate data, measure interobserver agreement, increase treatment integrity/procedural fidelity, and improve social validity. Consequently, hoarding and packing were addressed as parent report and scores on the CY-BOCS (Goodman et al., 1986) indicated these behaviours to be the most troublesome for the child and family. Direct behaviour observations and graphic depictions of behaviour frequency were used as primary measures of treatment effectiveness.

Hoarding was defined as collecting and saving items that did not belong to Rachel and/or that she did not purchase which were not used in a purposeful or productive way. For Rachel, hoarding involved the acquisition and failure to discard of paper products such as pamphlets, coupons, flyers, empty cardboard containers, toilet paper roles, scraps from recycling bins etc. Such items were typically collected from the homes of family and friends, stores, professional offices (e.g., doctors, dentists), school, and restaurants. All collected items were saved throughout Rachel's home (e.g., her room, family room, front hall closet, and kitchen) and stored in different manners (e.g., stuffed in large bins or bags, in desk drawers, in armoires / cabinets, or strewn about the floor). Baseline and treatment data of hoarding measured the exact number of items collected *and* saved per opportunity.

Packing was defined as placing various items in a bag, backpack, purse, or suitcase prior to leaving the home. For Rachel, packing typically involved repeatedly checking / rechecking what had been accumulated and/or removing and replacing items packed (i.e., exchanges). Typically, packing also resulted in Rachel leaving her home with multiple large bags filled with items that would not be utilized during her outing (e.g., bringing 2-3 heavy purses overflowing with toys, food, trinkets, etc. with her on a 10 min trip). Consequently, packing was considered to be ‘hoarding on the go’ by her family and this researcher.

It should be noted that naming such behaviour as ‘packing’ was necessitated to distinguish among behaviours that were topographically dissimilar in only minor ways. Whereas hoarding involved bringing paper products into the home, packing involved bringing diverse materials out of the home. This distinction was considered important in our research focusing on behaviour function over form, given evidence that different behaviour topographies may serve the same function (e.g., Lalli, 1999) and a single behaviour topography may serve multiple functions (e.g., Iwata et al., 1994; Kennedy, Meyer, Knowles, & Shukla, 2000). In actuality, the exact term *packing* is not utilized to describe OCD behaviour in the ADIS-P (Silverman & Albano, 1996), although packing would fit into the miscellaneous/other category of the interview. Research by Frost and Gross (1993) however, clearly indicates that hoarders characteristically carry more ‘just in case’ items with them in their pockets, purses, or cars, which appears consistent with our concept of ‘hoarding on the go’ or *packing*. Baseline and treatment data of packing measured the number of items placed into a bag. In the interest of keeping data collection simple for the family, documenting the number of items packed involved an exact count if fewer than 10 items were accrued and an estimation if more than 10 items were packed (e.g., 10+, 20+, 30+ etc.).

Duration data related to the amount of time spent packing were also collected during baseline. This involved recording, using a hand-held timing device, the elapsed time between Rachel beginning and finishing packing after having been informed that she would be going on an excursion. On some occasions, approximations of packing duration data were also necessitated, such as when Rachel packed behind closed doors (i.e., confirmation that packing occurred throughout the entire time she was out of sight could not be made). Although such data provided insight into the degree to which OCD-related behaviour interfered in Rachel's life, decreasing duration was not a primary objective of treatment as Rachel's parents were reportedly less concerned about how much time she took to pack than the copious quantity of things with which she regularly left her home. We therefore focused on decreasing the total number of items packed and worked under the assumption that reductions in duration would naturally coincide with packing fewer items. However, we also recognized that making difficult editing decisions about which few items to pack could possibly increase duration and thus continued to monitor time spent packing throughout treatment and follow-up.

### **Study 1: Functional Assessment and Analysis of OCD-related Behaviours**

#### **Rationale**

Some researchers have theorized that hoarding may occur as a result of different psychological variables controlling the behaviour (Abramowitz et al., 2008). For example, a person may display extreme saving behaviour when motivated by dysfunctional beliefs about the value of possessions (e.g., an exaggerated sense of sentimentality and/or aesthetic worth). Other individuals, or even the same person with inflated notions of value, may also compulsively collect items and fail to discard them when motivated by fears of disastrous consequences (i.e., fears of discarding important items). In such cases, hoarding may be predicated on avoidance

tactics, as keeping everything eradicates worries of mistakenly discarding items. While such research begins to tackle functionality from a cognitive perspective, increased investigation of operant controlling variables from a behaviour analytic perspective is also necessitated.

### **Setting**

All aspects of Study 1 were completed in an observation/ therapy room in the Jack and Nora Walker Canadian Centre for Lifespan Development Research at Brock University, within the participant's home, and in community locations typically frequented by the family (e.g., stores, offices, homes of relatives, etc.).

### **Procedure**

**Functional assessment.** A comprehensive functional assessment was completed for both behaviour topographies to assist in identifying maintaining variables. In the case of hoarding, functional assessment results were also used to guide the development of impending experimental conditions. Functional assessment included several sessions of direct observation of the behaviours and indirect (descriptive) assessment involving parent interviews and use of the Questions About Behavioral Function (QABF; Matson and Vollmer, 1995) by the primary caregiver (mother) and the first author.

In addition, anecdotal observations and recordings of temporally sequenced events (also called Antecedent, Behavior, Consequent recording or ABC data collection; Bijou, Peterson, & Ault, 1968) pertaining to packing were completed by Rachel's mother on eight occasions, as procedural limitations precluded experimental analyses of the behaviour (see Appendix H). For example, it was determined that conducting a functional analysis would be very time consuming and inconvenient for the family, as an excursion would have to coincide with each presented condition given that packing only occurred prior to Rachel leaving her home. As such, it was

anticipated that scheduling assessment periods around naturally occurring family outings would result in a functional analysis taking months to complete (as only one condition could be run per outing). Alternatively, having the family contrive outings in an attempt to shorten the process would be an unrealistic request and applying procedural variations to expedite a functional analysis, such as not following through with trips Rachel was informed of, were also decidedly problematic (e.g., emotional reactions). Target behaviours and associated environmental events are documented in Table 2.

***Interobserver agreement for functional assessment.*** Interobserver agreement on the antecedents and consequences documented during ABC data collection associated with the occurrence of packing was assessed during 62.5% of the observations by the primary researcher or the participant's father, who had attained a 100% agreement criterion for one observation session. For each occurrence of packing marked by the primary observer, an agreement was scored if the second observer's data sheet revealed the same antecedent and consequent events as well as the occurrence of packing. IOA for all responses and environmental events was 100%.

### **Functional analysis.**

***Research design.*** Subsequent to the functional assessment, a full functional analysis (Hanley et al., 2003) of hoarding was conducted with the participant through the repeated presentation of a *social attention* condition, an *automatic* condition, and a *control* condition using a multielement design (Baer, Wolf, & Risley 1968). The procedures utilized were similar to those described by Iwata et al. (1982/1994), with a slight variation being employed during *alone* conditions. Although it seemed plausible that access to tangibles could in part contribute to hoarding and packing behaviour (as topographies involve the collection, saving, and gathering of tangible items), parent reports, direct observations, and indirect assessments did not suggest that



attaining tangible items acted as a reinforcer for target behaviours (i.e., Rachel paid relatively little interest to the items). Thus a *tangible* condition was not conducted. Likewise, non-experimental assessments indicated that while Rachel periodically temporarily avoid excursions by engaging in packing behaviour, she never entirely escaped outings or tasks contingent upon either target behaviour. Thus, an *escape* condition was not conducted.

Recognizing that problem behaviour may vary as a function of those conducting analyses (Ringdahl & Sellers, 2000) and that clinically inexperienced individuals can quickly acquire skills needed to implement functional analyses (Iwata et al., 2000), all assessment sessions for hoarding were run by the child's mother in an attempt to replicate naturally occurring contingencies. Prior to conducting the functional analysis, the researcher trained the parent on the implementation of aforementioned conditions. Training involved providing rationales, descriptions, modeling, performance feedback, and practice over two hours.

In the *social attention* condition, the parent read a magazine while Rachel was instructed to play on her own / do what she liked with preferred toys available for use. Contingent on hoarding behaviour, Rachel's mother provided a brief verbal comment on a fixed-ratio one (FR1) schedule of reinforcement. All other behaviour was ignored. The *alone* condition involved placing Rachel in an empty session room while two data collectors observed through a one-way mirror. This condition deviated from literature involving *alone* conditions as the room was not void of Rachel's belongings. This distinction was made to accommodate the fact that if hoarding was to occur during the condition, Rachel would require somewhere to put the items she had collected (i.e., into the bags she had with her), thus one of her bags remained with her for the duration of the condition. Finally, the *control* condition was included in which no demands were placed, attention was provided noncontingently every 30 seconds, and access to various preferred

items/activities was unrestricted. All hoarding behaviours displayed during this condition were ignored.

All randomly conducted sessions were seven minutes in length and an approximate five minute break was provided between conditions. Thirteen manipulations were completed over two consecutive weeks, with each of two assessments lasting 1.5 hours. Frequency counts of hoarding were documented using a paper and pencil system during each condition. This involved documenting each time Rachel picked up items from the room and placed them in a bag or pocket rather than a count of the number of items collected (as she alternated between collecting and saving one item at a time, with collecting and saving several items at a time e.g., placing a stack of coupons in her bag).

***Interobserver agreement for functional analysis.*** All experimental sessions were video recorded and observed through a two-way mirror. Two data collectors simultaneously yet independently tallied hoarding behaviour and total count IOA was calculated during 100% of sessions by dividing the number of agreements on the occurrence of the behaviour by the number of agreements plus disagreements and multiplying by 100 (Cooper et al., 2007). Mean agreement was 100%.

***Procedural fidelity.*** Procedural fidelity measures were also scored for parental implementation of the functional analysis. This involved the use of a checklist outlining the steps of the FA, which corresponded to the training provided to the parent (see Appendix I). One-hundred percent of sessions were assessed by two observers to determine adherence to functional analysis procedures (e.g., for the *attention* condition, integrity was scored if attention was provided contingent on each episode of the target behaviour and not for other behaviours). The total percentage of agreement for adherence to functional analysis procedures as outlined was

100%, calculated by dividing the number of agreements on treatment components completed by the number of agreements plus disagreements and multiplying by 100 (Cooper et al., 2007).

## Results of Study 1

### Functional assessment.

**Questions About Behavioral Function.** The QABF was independently completed by Rachel's mother and the primary researcher for both behaviour topographies. Responses to 25 questions equally divided across five behaviour functions, represent how often target behaviour occurs (e.g., escape; how often does the client engage in the behavior when he/she is asked to do something; 0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*). For hoarding, non-social reinforcement received the highest mean rating ( $M = 2.3$ ; *sometimes*), followed by attention ( $M = 2$ ; *sometimes*) when averaging across respondents. Other maintaining variables were not identified for hoarding. Variations in the number of items endorsed for hoarding were evident across respondents; Rachel's mother endorsed 3 of 5 non-social items and 1 of 5 attention items; the researcher endorsed all 5 non-social items and 4 of 5 attention items.

Similar results were attained for packing; non-social reinforcement received the highest mean rating ( $M = 2.9$ ; *often*), followed by attention ( $M = 2.6$ ; *sometimes/often*) when averaging across respondents. Other maintaining variables were not identified for packing. While both respondents endorsed 4 of 5 non-social items for packing, Rachel's mother endorsed 3 of 5 attention items and the researcher endorsed 4 of 5 attention items.

Taken together, results of the QABF indicated both behaviours to be very closely associated with non-social reinforcement and attention with means of 2.6 and 2.3 respectively. Attention also appears slightly less influential when the number of items endorsed across

functions is taken into consideration: non-social =16; attention = 12. A summary of QABF results are presented below.

Table 1

*Summary of QABF Results for Hoarding and Packing*

Hoarding	Non-social		Attention	
	# of items endorsed	Mean score	# of items endorsed	Mean score
Parent	3	2.7	1	2
Researcher	5	2	4	2
Across respondents	4	2.3	2.5	2

Packing	Non-social		Attention	
	# of items endorsed	Mean score	# of items endorsed	Mean score
Parent	4	2.8	3	2
Researcher	4	3	4	3
Across respondents	4	2.9	3.5	2.6

***ABC data collection for packing.*** Results of ABC data collection for packing are presented below. Table 2 presents a transcription of environmental events that occurred before and after the behaviour. See Figure 1 for a summary of information attained via ABC data collection (documented number of items packed and packing duration associated with specified consequences).

Table 2

*Transcription of ABC Data Collection for Packing*

Observation	Antecedent 1: told of destination	Antecedent 2: engagement in an activity	Number of items	Duration of packing (min.)	Consequence while packing
1	Preferred location	Engaged	8	15	Alone
2	Non-preferred location	Not engaged	30+	20	Alone
3	Non-preferred Location	Engaged	7	11	Attention
4	Preferred Location	Engaged	30+	40	Alone
5	Non-preferred Location	Not engaged	30+	45	Alone + attention
6	Non-preferred Location	Engaged	20+	17	Alone + attention
7	Preferred Location	Not engaged	20+	10	Attention
8	Preferred Location	Not engaged	20+	20	Attention

*Note.*

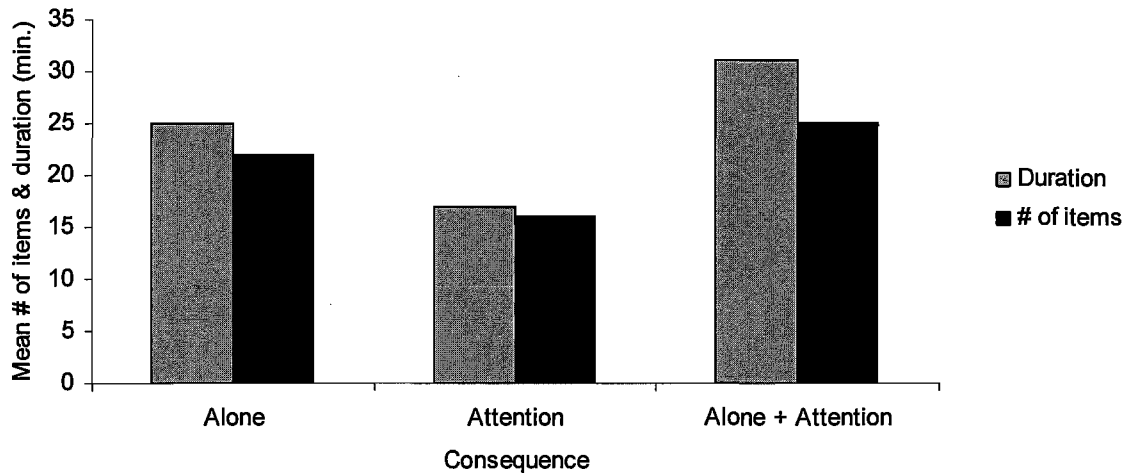
Antecedent 1: refers to whether Rachel was told if she was going to a preferred or non-preferred location.

Antecedent 2: refers to whether Rachel was engaged or not engaged in an activity when told of an impending excursion.

Number of items: refers to an exact # of items packed if  $\leq 10$  or an approximate # if  $>10$ .

Duration: refers to how long it took Rachel to pack in minutes.

Consequence while packing: refers to how others responded to Rachel while she exhibited packing behaviour (left her alone and/or provided attention).



*Figure 1.* Summary of ABC data collection for packing.

As depicted, consistent results were evident across functional assessment tools; the QABF and ABC data both supported the hypothesis that packing was maintained by social and non-social consequences. ABC data also revealed that on some occasions both consequences followed packing behaviour. For example, Rachel would sometimes initially be left alone while she packed but then eventually be provided attention (i.e., instructions to hurry up or put some things back).

**Results of functional analysis.** Results of the functional analysis indicated that hoarding occurred most often during alone conditions ( $M = 5.5$ ; range = 4-7) and attention conditions ( $M = 4.75$ ; range = 4-6). Gradual decreases in the frequency of hoarding occurred during control conditions, in which attention was provided noncontingently. These results suggest that hoarding was multiply maintained by automatic reinforcement (+ or -) and socially mediated positive reinforcement. Figure 2 displays the results for the functional analysis conducted in Study 1.

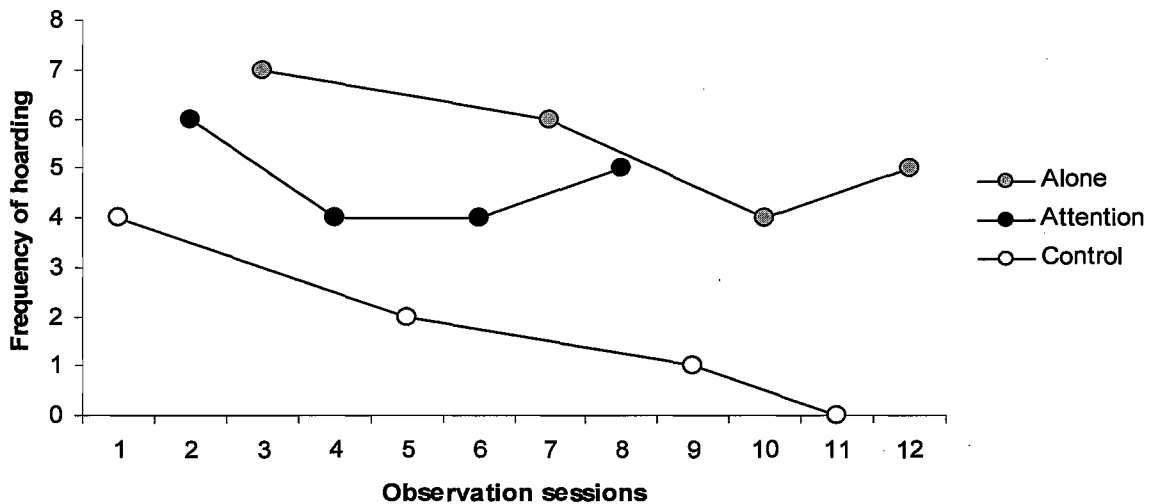


Figure 2. Results of functional analysis for hoarding.

Although not depicted, note that hoarding did not occur during an *attention* condition presented in session twelve of the functional analysis. This zero occurrence of hoarding is believed to be a direct result of Rachel unknowingly finding a pencil in her pocket at the onset of the condition which she then used to draw for most of the condition (6 out of 7 minutes). Given that her engagement with the pencil may have altered her motivation for social interaction (she was preoccupied with drawing), we considered the integrity of that session to be compromised and excluded it from our results.

## Study 2: Function-based Treatment of OCD-related Behaviours of a Child with ASD

### Rationale

Results of the functional assessment and analysis were the dominant factor in the decision to abandon a prescriptive treatment approach based solely on behaviour classification, and the adoption of a client specific, function-based intervention plan.

**Setting**

All aspects of Study 2 were completed within the participant's home and in community locations typically frequented by the family (e.g., stores, offices, homes of relatives, etc.).

**Data Collection and Interobserver Agreement**

All data collection involved observations and documentation of the target behaviours by Rachel's mother and reliability was established during a brief training period at the onset of the study (see Appendix G for copies of data collection forms). Three additional trained observers (two graduate students and Rachel's father, a college graduate) simultaneously but independently collected data along with Rachel's mother. Interobserver agreement was calculated on a trial-by-trial basis. The number of agreements on the occurrence or nonoccurrence of a response was divided by the number of agreements plus disagreements and converted to a percentage (Cooper et al., 2007).

During baseline, interobserver data was collected 33% of the time for hoarding and 48% of the time for packing; 100% agreement was determined for both behaviours. During treatment, IOA was calculated 38% of the time for hoarding and 47% of the time for packing; 100% agreement was determined for both behaviours.

**Procedure and Experimental Design**

An individualized function-based treatment plan was created following functional assessment and analysis which comprised three overarching components; antecedent manipulations, differential reinforcement, and extinction. All three aspects of treatment were simultaneously utilized and a multiple baseline across behaviours design (Baer, Wolf, & Risley 1968) was used to assess treatment effectiveness. Similar to the assessment phase, all aspects of treatment were implemented by the parent within the natural environment in attempting to



replicate daily life and facilitate generalization. Therefore, part of treatment involved teaching the parent to implement each element of the multi-component intervention package in various environments. Training involved discussions, reading materials, modeling, role-playing, practice, and feedback over two hours.

First, antecedent manipulations entailed social stories (Gray, 1994) and establishing rule governed behaviour (Malott, 1988; Skinner, 1969). Use of social stories involved reading a short story discussing hoarding or packing to Rachel once per day. Concepts presented in the stories included identifying items that are useful and useless, problems associated with hoarding (e.g., limited space in her room to play as a result of clutter), the benefits of not packing and hoarding (e.g., tokens earned, parents happy). Rachel was not expected to read any part of the stories given her limited reading abilities; however, she was required to look at the books along with her mother and to periodically point to various pictures representing items established as being appropriate to collect (e.g., money, stickers) or pack (e.g., wallet, toiletries), and not appropriate to collect (e.g., empty toilet rolls, scraps of paper from recycling bins) or pack (e.g., countless small items such a doll shoes) with assistance (see Appendix K)

Rules, or contingency-specifying stimuli which are function-altering (Baum, 1995; Kunkel, 1997; Schlinger, 1990; Zettle, 1990), were also presented to Rachel (see Appendix L). These rules indicated that she should pack a minimum number of items, that she should not bring home things that did not belong to her, and that tokens and backup reinforcers would be earned for following the rules (Glynn, 1990). These rules were created to resemble a contingency or behavioural contract in that a relationship between target behaviours and access to a specified reward was established; however, in considering Rachel's level of cognitive functioning, a formal, written contract was not prepared, agreed upon, or signed by both parties (Rachel and her

mother). Instead, established rules were simply read aloud to Rachel prior to informing her that she would be going somewhere (i.e., immediately before packing would typically occur) and prior to entering a community location where preferred items may be available for her to collect (e.g., immediately before going into a grocery store where a wall of coupons would be visible).

Differential reinforcement was also extensively used as part of treatment for hoarding and packing. First, variable-momentary differential reinforcement of other behaviour (VM-DRO) was used in attempting to disrupt the response-reinforcer contingency and abate an establishing operation that supported the problem behaviours through the abundant provision of one of two identified maintaining reinforcers (attention) (Lindberg, Iwata, Kahng, and DeLeon, 1999). During the VM-DRO intervention, target behaviours were placed on extinction, and Rachel received approximately five seconds of attention from her mother when target behaviours were not occurring at the end of each variable 120 second interval. This initial time interval of 120 seconds was determined through a combination of two things: (1) observations of parent / child interactions during 'optimal times' (i.e., when Rachel's mother was not distracted;  $M = 180$  seconds) and (2) mean inter-response time during the attention sessions of the functional analysis ( $M = 84$  seconds)

In the interest of simplifying the application of VM-DRO for use in the natural environment, intervals were not reset if problem behaviours occurred when reinforcement was scheduled for delivery. Instead, attention was briefly withheld (approximate 5 second lapse between behaviours ceasing and the provision of attention).

Variable-interval differential reinforcement of other behaviour for hoarding (VI-DRO; Reynolds, 1961) and differential reinforcement of low rate behaviour for packing (DRL; Deitz, 1977) were also employed. These applications of differential reinforcement were used to both

reinforce behaviour suppression and to permit contact with tangible reinforcers that could compete with automatic positive reinforcement which potentially contributed to the occurrence of hoarding and packing (Handen, Apolito, & Seltzer, 1984; Himle, Woods, & Bunaciu, 2008).

During VI-DRO, Rachel was expected to suppress all hoarding behaviour and tangible reinforcers (tokens plus descriptive praise) were delivered contingent upon behaviour absence during intervals of varying length (VI-DRO-45 minutes; Chiang, Iwata, & Dorsey, 1979). This application of DRO was selected as the duration of community outings varied depending on factors such as where she was going and the number of places visited. Reinforcement was delivered each time she left her home and returned without bringing anything back that did not belong to her or that she did not purchase; the exact number of tokens earned varied according to her mother's evaluation of how difficult it was for Rachel to refrain from hoarding, given where they went and what items were available for Rachel to take. For example, on one observed outing, Rachel received 3 tokens for not hoarding while at a grocery store with a large wall of coupons on display. Conversely, Rachel received one token each day that she returned home from school without hoarding any items from her classroom recycling bin. Rachel's mother reported that this discrepancy was made as coupons were one of Rachel's favorite things to hoard and there was a large quantity available to her, while random papers were less desirable and commonplace for Rachel.

During DRL, Rachel was expected to keep packing behaviours to a minimum, as taking *some* necessities with her on excursions was deemed appropriate so long as a limited number of items were packed and packing time was brief. DRL criterion was established by calculating the mean number of items packed during baseline. Discussions with Rachel's mother then identified 25% of baseline responding to be a desirable treatment outcome. Thus, although some flexibility

was recognized as being necessary, such as when Rachel would be going on longer excursions (e.g. overnight at grandparents, family vacation etc.), an initial behaviour target of packing no more than seven items on a regular basis was established. While we acknowledged that a steadily declining criterion may have facilitated meeting treatment goals, we opted instead to keep response targets consistent in consideration of Rachel's cognitive abilities. We anticipated that such consistency may enable Rachel to eventually remember established parameters thereby negating reminders from her mother and minimizing the social attention received for asking questions about packing (behaviour to be addressed via extinction).

Acquired tokens were later exchanged for back-up reinforcers. In the interest of the keeping costs low, Rachel's mother selected three relatively inexpensive items each week which she was willing to purchase (e.g., nail polish, Barbie outfit, coloured markers) and Rachel chose an item from that list which she would exchange tokens for. Although a formal preference assessment was not conducted, the presented items included things Rachel commonly purchased, spoke about, and played with. Edibles (e.g., McDonald's sundae) and fun activities (e.g., going to a movie with her father) were also available for selection, as such consumable reinforcers would minimize the accumulation of more 'stuff'.

As all applications of differential reinforcement involve reinforcing a favored response class and withholding reinforcement for another non-preferred response class (Cooper et al., 2007), we correspondingly utilized extinction (Day, Rea, Schussler, Larsen, & Johnson, 1988; Iwata, Pace, Cowdery, & Miltenberger, 1994; Richman, Wacker, Asmus, & Casey, 1998) as part of treatment. Though both hoarding and packing were identified as being multiply maintained by two distinct contingencies (social positive and automatic reinforcement), further differentiation among the specific type of automatic reinforcement (Au+ or Au-) was unfeasible. Therefore, as

“the procedures that define extinction in a given situation are determined by the specific nature of the reinforcement to be *discontinued*” (Iwata et al., 1994, p. 132), extinction involved manipulations of only the attention component and attempts to withhold unknown non-social reinforcers were not made (Lalli, Casey, & Kates, 1997). Attention was also withheld when known precursors to the non-preferred target behaviours of were displayed (e.g., talking about papers she saw, touching frequently collected items, asking about how many things she can bring, etc.). Finally, while all family members were aware of treatment components, their implementation of differential reinforcement and extinction was not specifically requested or monitored, however antidotal reports indicated only Rachel’s mother ignored hoarding or packing.

### **Fading Treatment**

Being mindful of the labor involved in implementing the designed multi-component treatment plan, attempts to fade treatment were made. Given Rachel’s cognitive functioning; however, we determined that some remaining degree of intervention may be necessary to maintain treatment benefits. Thus, we did not endeavor to remove treatment in its entirety but rather aspired to ultimately reach a level of intervention that could be easily maintained by the family in the long term.

Treatment fading occurred during two separate intervals, with each fade taking place after a minimum of nine stable data points being attained in the previous phase. Treatment fading involved a reduction in the frequency of reading social stories and rules, and thinning the scheduled delivery of conditioned reinforcers. While treatment initially involved reading the social stories daily and reading the rules prior to all excursions or entering locations where paper products would be available, stories and rules were read on average every three days and seven

days, respectively following each phase change (treatment fade). The delivery of tokens was also progressively thinned from a continuous ratio schedule of reinforcement (FR1) to a variable interval schedule (VI: three days, seven days) to avoid ratio strain while progressing towards more naturally occurring schedule of reinforcement. All other aspects of treatment, namely the use of extinction and VM-DRO, remained in effect throughout our involvement with the family. These components were held constant, as the family indicated that they were easily practiced.

### **Treatment Integrity**

Parental adherence to treatment components (e.g., extinction consistently used, tokens delivered upon meeting criteria, etc.) was also assessed using a procedural checklist of treatment implementation steps (see Appendix J). Forty percent of sessions were alternately assessed by three observers (the primary researcher, a trained graduate student, and the participant's father with all individuals having attained a 100% agreement criterion for one observation session). The percentage of treatment integrity was calculated by dividing the number of steps completed correctly during an observation by the total number of steps to be completed and multiplying by 100 (Cooper et al., 2007). The percentage of treatment integrity was 96.5%.

### **Results of Study 2**

**Objective data results.** A functional relationship between the independent variable (e.g., multicomponent treatment plan: social story, rule rehearsal, DRO, and DRL) and the dependent variable (direct observation of OCD-related behaviours) was demonstrated through a multiple baseline across behaviours design. Immediate improvements in the first behaviour (hoarding) occurred when treatment was introduced, while the second behaviour (packing) continued at baseline levels as treatment was withheld. Improvements in the second behaviour (packing) occurred only when treatment was directly applied. Consequently, both OCD-related behaviours

(hoarding and packing) were effectively diminished through the use of a function-based treatment plan. Follow-up data collection, involving weekly probes of target behaviours, indicated that decreases in hoarding and packing maintained during two consecutive months.

Figure 3 depicts these results.

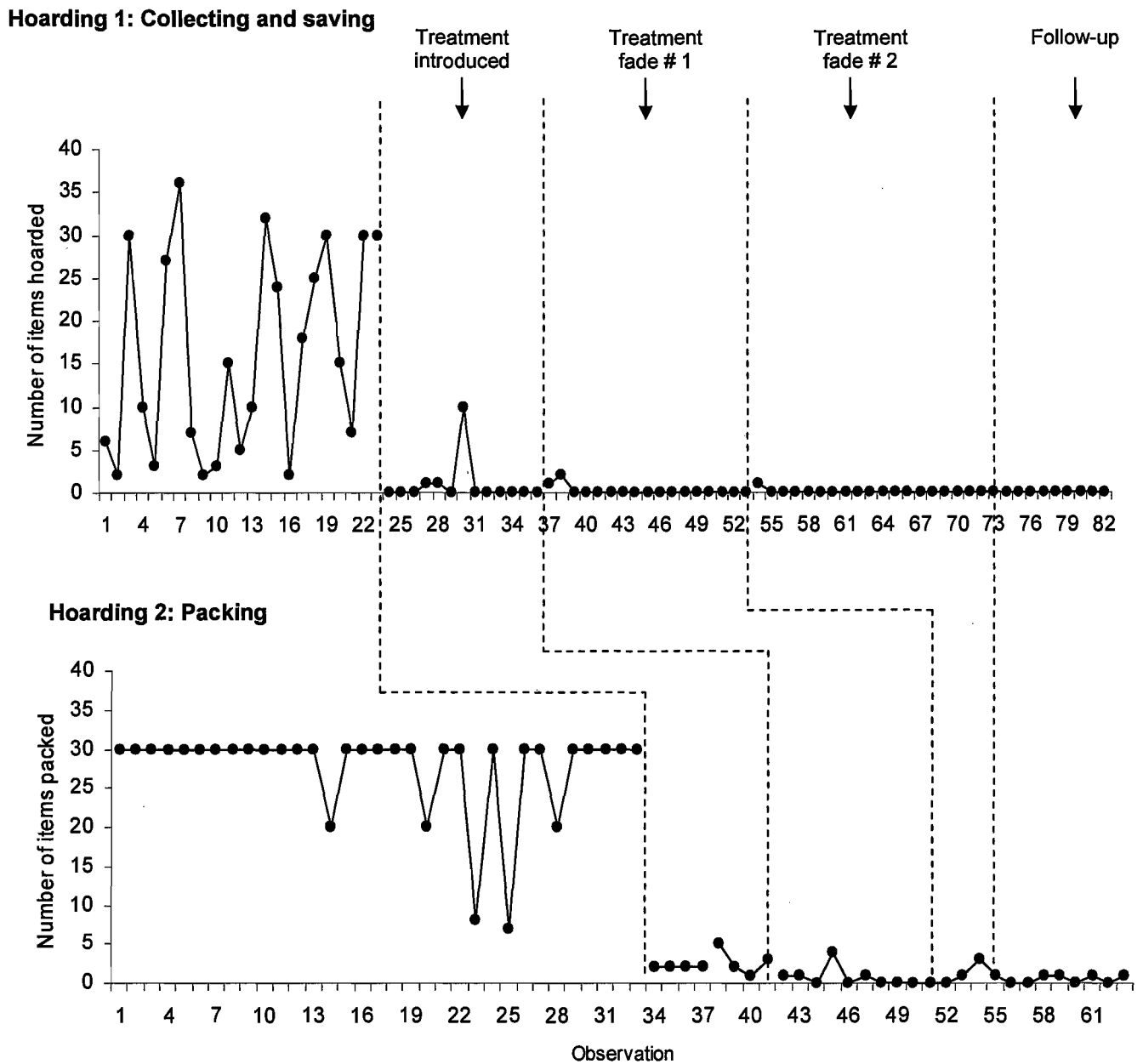


Figure 3. Results of treatment on 2 OCD-related behaviours of a child with ASD.

Figure 4 represents changes in Rachel's hoarding behaviour. Throughout baseline, Rachel's hoarding occurred during 100% of opportunities (i.e., when paper products available outside her home) and the mean number of items collected was 16.04. Conversely, hoarding occurred during 12% of opportunities, with a mean number of items collected of .32 throughout treatment. Hoarding did not occur during follow-up.

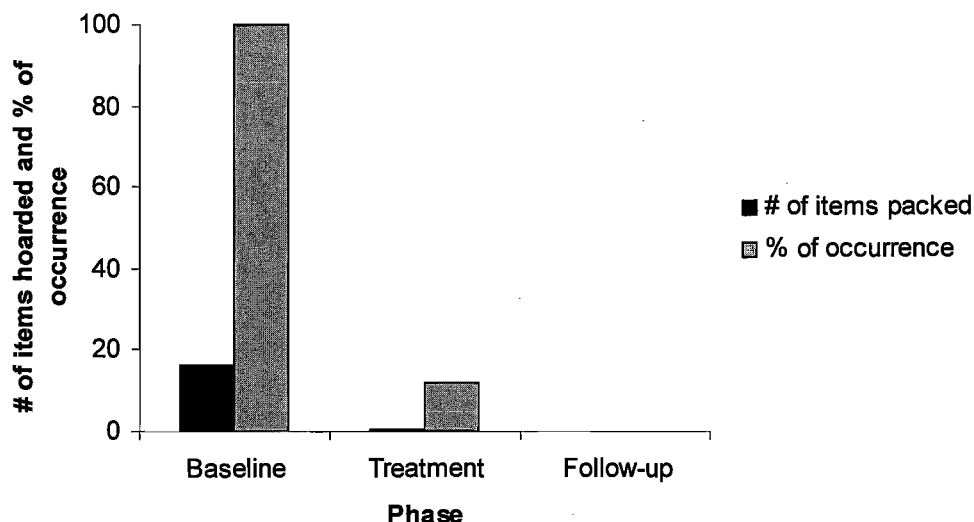
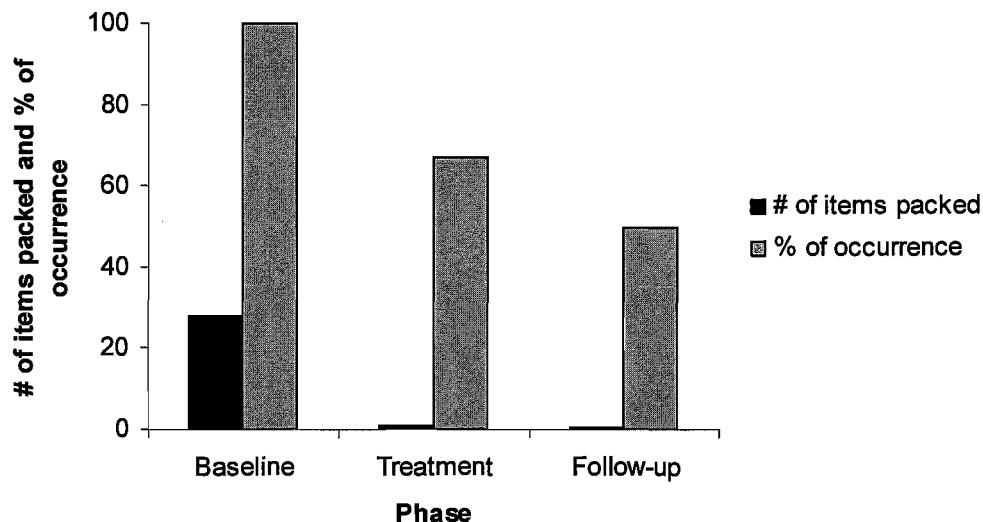


Figure 4. Baseline and treatment data of hoarding.

Similar results for packing are depicted in Figure 5. During baseline, Rachel engaged in packing 100% of the time prior to leaving her home and the mean number of number of items packed was 28. While Rachel continued to exhibit packing behaviour during treatment 67% of opportunities (again, deemed appropriate given that people often bring some personal belongings with them when leaving their homes), desired outcomes for the number of items packed were exceeded with an average of one item per outing. Packing occurred during 50% of time and an average of .5 items was packed during follow-up.

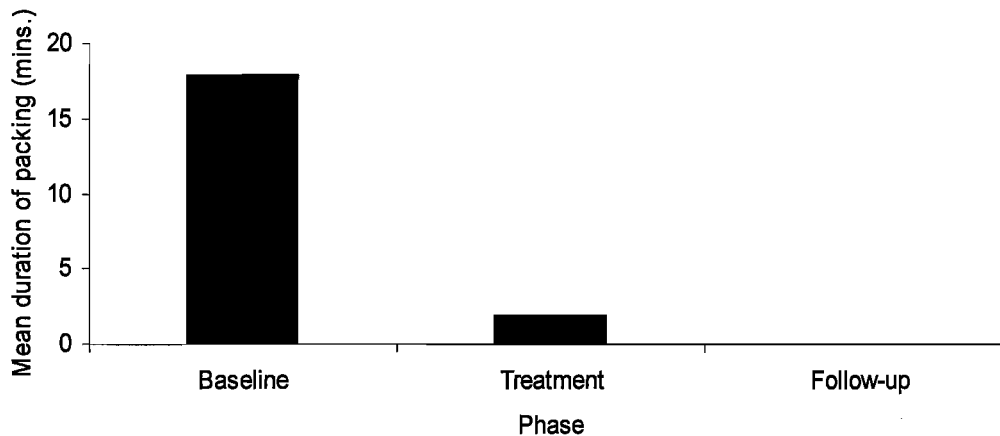




*Figure 5.* Baseline and treatment data of packing.

Although not depicted, two increases in the number of items packed occurred during treatment. For example, after seven days of successfully packing only a few items (average < 3), Rachel packed 30+ items in mid August immediately prior to spending three nights at her grandparent's home while her parents were away. Such temporary increases were excluded from the data as they were deemed justifiable, did not reflect regression, or delay treatment fading due to their rational correspondence with specific locations and/or lengths of excursions.

Although decreasing the duration of packing was not a primary focus of intervention, similar improvements were demonstrated. Changes in the duration of packing observed over the course of this study are presented in Figure 6.



*Figure 6.* Average duration of packing during baseline, treatment and follow-up.

As Figure 6 depicts, packing occupied much less of Rachel's time following the introduction of treatment. In fact, on several days Rachel did not spend time packing items at all but rather promptly left her home with one small pre-packed purse containing an average of five necessities (e.g., wallet, lip balm, notepad, pen, and one small toy).

#### **Results of subjective measures.**

Post-treatment administration of the COIS-RP (Piacentini et al., 2007) revealed a clinically significant improvement evidenced by a 68% decrease in symptom severity. Conversely, pre-post administration of the CY-BOCS (Goodman et al., 1986) showed zero change and thus an amendment to OCD severity was not made (i.e., Rachel was assessed as having high-moderate OCD both before and after intervention). An obvious explanation is that post-treatment responses were related to behaviours previously not rated. As the CY-BOCS generates OCD severity scores based on a child's four most troublesome behaviours at any given time, we emphasize that it did not reflect improvements that indeed occurred for the targeted behaviours. Instead, post-treatment scores represent the addition of two newly identified behaviours (having only one food visible at a time and confessing minor things) which

substituted hoarding and packing, given that problems associated with hoarding and packing had been resolved.<sup>5</sup>

With the exception of the CY-BOCS (Goodman et al., 1986), all subjective measures demonstrated treatment efficacy. At post-test, the CYBOCS (Goodman et al., 1986) indicated no change (high-moderate OCD with a total score of 23). In contrast, changes in symptom severity were indicated by the COIS-RP (Piacentini et al., 2007). From pre-test to post-test, the COIS-RP showed a 68% decrease with an initial score of 25 and a post-treatment score of 8. In particular, improvements were identified with regard to family life/activity and social interaction problems.

Three secondary outcome measures of treatment effectiveness were also conducted. First, the PSI-SF (Abidin, 1995) revealed that Rachel's mother was in the 99<sup>th</sup> percentile for overall total stress throughout her participation in this research. Total stress raw score from pre-test to post-test showed only a slight decrease from 129 to 121 (6.2%). Second, the Quality of Life Questionnaire (Feldman et al., 2002) was administered; pre-treatment assessment resulted in an initial score of 21 (of a highest possible score of 56) while post treatment administration resulted in score of 9 (57% decrease). As a lower score indicates less familial disruption related to the participant's problem behaviour(s), these results reveal clinically significant improvements. Finally, the consumer satisfaction questionnaire (Feldman et al., 2002) revealed a high level of satisfaction with treatment received with a total score of 26 (out of a highest possible score of 28 (92.8%).

### **General Discussion**

The current studies aimed to establish the usefulness of functional analysis methodology in identifying variables responsible for the maintenance of OCD-related behaviours displayed by an individual with ASD and investigated the efficacy of a corresponding function-based

treatment plan. As hypothesized, results indicated that hoarding and packing occurred regularly when associated with participant isolation (automatic reinforcement) and parental attention (socially mediated positive reinforcement). Additionally, objective data demonstrated that improvements in aberrant behaviour coincided with treatment implementation and maintained during two month follow-up as anticipated. With the exception of the CY-BOCS (Goodman et al., 1986), all subjective measures demonstrated treatment efficacy.

### **Similarities to Previous Research**

Several similarities between our presented studies and previous research exist. First, our research resembles other studies involving the indirect assessment and treatment of OCD-related behaviour displayed by children with ASD (McCambridge et al., 2009; Sigafos et al., 2009; Vause et al., 2008). Similar to these studies, our initial behaviour observations lead to the hypotheses that social consequences contributed to behaviour occurrence (McCambridge et al., 2009; Sigafos et al., 2009). We also incorporated the QABF as part of functional assessment as did McCambridge (et al.) and Vause (et al.).

Our application of functional analysis methodology also resembles the procedures utilized and the results attained in the evaluation of repetitive behaviour including bizarre vocalizations (Lancaster et al., 2004; Mace et al., 1988; Wilder et al., 2001), tic behaviours (Scotti et al., 1994; Watson & Sterling, 1998), and an OCD-related compulsion (May et al., 2008). Like these studies, we combined direct and indirect assessments (Scotti et al.), instructed parents on how to perform a functional analysis (Watson & Sterling), and alternated experimental conditions in a multielement design (e.g., Mace et al.; May et al.; Wilder et al.). Additionally, results of the functional analyses completed in each of these studies resemble our

research indicating that social variables may be in part responsible for the maintenance of aberrant behaviour.

Both the content and outcome of our intervention resemble associated previous research. Like previous studies treating anxiety in ASD, we included active parent involvement (e.g., Lehmkuhl et al., 2008; Reaven & Hepburn, 2003; Wood et al., 2009). Improvements in targeted behaviours similar to those of previous studies also occurred with the introduction of various function-based treatment components including extinction (Mace et al., 1988; Watson & Sterling, 1998; Wilder et al., 2001), and DRO (Watson & Sterling). Finally, analogous to research by McCambridge et al. (2009) and Vause et al. (2008), we included measures of quality of life and consumer satisfaction.

### **Extensions of Previous Research**

While McCambridge et al. (2009) and Vause et al. (2008) incorporated indirect assessment of OCD behaviour in children with ASD, our research extends beyond these investigations by having multiple respondents complete the QABF, conducting a full functional analysis with parent run conditions, and using exclusively parent run treatment. Our research also extends upon the only other known study involving a functional analysis of OCD related behaviours (May et al., 2008). Unlike May et al., who used medication to treat OCD despite having identified social consequences as maintaining variables, we introduced a treatment plan stemming from results of experimental manipulations.

### **Discussion of Functional Assessment**

Consistent results were obtained through the QABF (Matson & Vollmer, 1995) and a functional analysis of hoarding; both indicating automatic reinforcement and social reinforcement as being maintaining variables for the behaviour. Functional assessment measures

employed for packing, which included ABC data (Bijou et al., 1968) as a functional analysis was not feasible, also revealed consistent results; both the QABF and ABC data identified a relationship between packing, automatic reinforcement, and social reinforcement. Positive treatment outcomes ultimately supported the validity of resultant hypothesized functions (Repp, Felce, & Barton, 1988).

These results suggest that indirect and descriptive measures may assist in identifying maintaining variables and creating effective treatments for problem behaviour when a functional analysis is not feasible (e.g., low rate/ high intensity behaviour, ethical concerns, technical limitations etc.; Paclawskyj, Matson, Rush, Smalls, & Vollmer, 2001). However, as purely correlational, non-experimental measures have been shown to be unreliable (e.g., Lerman, & Iwata, 1993; Pence, Roscoe, Bourret, & Ahearn, 2009; Thompson & Iwata, 2007) they should be interpreted with caution.

For example, while both respondents ultimately endorsed the same maintaining functions for each behaviour via the QABF (Matson & Vollmer, 1995), there was poor correspondence between the number of items endorsed overall (e.g., Non-social: 7 parent; 9 researcher; Attention: 4 parent; 8 researcher), suggesting inaccurate conclusions. We postulate that different interpretations of the questions may in part account for such discrepancy.

Variations in the number of items endorsed on the QABF by different respondents also highlight two possible limitations for its use specifically with OCD-related behaviour. First, all items in the automatic negative reinforcement category are entirely *physical* in nature (e.g., he/she engages in the behaviour because he/she is in pain; is ill; is physically bothered; is physically uncomfortable; or is not feeling well). As a result, these descriptions do not reflect the distressing emotions (potentially accompanied by physical discomfort) that may act as

establishing operations for OCD behaviour maintained by automatic negative reinforcement (e.g., anxiety attenuation). As the listed 'physical' antecedents did not apply to Rachel, only items relating to automatic positive consequences were endorsed (non-social) when in actuality automatic negative reinforcement may have contributed to target behaviour occurrence. While we underline that feelings are simply unobservable private behaviour subject to the laws of reinforcement, punishment, stimulus control etc. that govern other behaviour (i.e., not causal; Skinner, 1969), we postulate that enhancements to the QABF similar to those utilized by Vause et al. (2008) and McCambridge et al. (2009) may help to further differentiate controlling variables. Based on the DSM-IV-TR description of OCD, these researchers modified the QABF to include questions designed to reveal possible correlations between anxiety and OCD (e.g., does the child display facial expressions that suggest he/she is worried?). While we put forward that a distinction among 'escape' and 'arousal reduction' automatic negative reinforcement can not be made, consideration of the role of anxiety as an EO for compulsive behaviour is warranted.

A second limitation of the QABF in assessing hoarding behaviour was identified with regard to the 'tangible' category. Interestingly, 'access to tangible reinforcement' was not identified with the scale as a possible maintaining function even though Rachel's presenting problem behaviour involved the acquisition of items. According to our appraisal; however, four of five questions on the scale designed to reveal an 'access to tangible' function are phrased in such a way that attaining desired items inevitably involves the actions of other people. These include 1) engages in the behaviour when you take something away from him/her, 2) engages in the behaviour when you have something he/she wants, 3) engages in the behaviour when a peer has something he/she wants, and 4) he/she seems to be saying "give me that (toy item, food

item)” when engaging in the behaviour. As such, these questions appear biased towards a social positive function to the exclusion of automatic positive consequences that may be associated with hoarding behaviour (Steketee & Frost, 2007). Therefore, future research involving the creation of a reliable and valid interview designed specifically for hoarding may prove beneficial.

### **Discussion of Functional Analysis**

As indicated, our results resemble the limited available research indicating that social variables may contribute to OCD-related behaviours displayed by people with ASD (McCambridge et al., 2009; Sigafos et al., 2009) and those without ASD (May et al., 2008). Although the specific form of automatic reinforcement also identified as contributing to hoarding and packing was not determined, a conceptual analysis supports both types as plausible options. From an applied behaviour analytic perspective, it is possible that negative emotions (e.g., obsessive thoughts) functioned as establishing operations and that the momentary relief which comes from engaging in hoarding and packing negatively reinforced on-going occurrence of these behaviours. It also is possible that deprivation of self-stimulation functioned as an EO and that pleasurable sensations produced from engaging in hoarding and packing (e.g., thrill of acquiring items) maintained behaviours. We put forward, however, that attaining empirical support for either hypothesis via typical functional analysis methodology is prevented for three reasons.

First, although ‘degrees of aversiveness’ can be manipulated in a standard escape format (Roscoe, Rooker, Pence, & Longworth, 2009; Weeks & Gaylord-Ross, 1981), even well planned and precisely executed contrived aversive conditions may fail to create establishing operations equivalent to those which result from naturally occurring isolated aversive conditions.



Miltenberger (2005) provides an equivalent sentiment in stating that “researchers cannot manipulate the internal stimulation involved in automatic negative reinforcement to show its functional relationship to the behavior, nor can they measure the change in the internal stimulation following the occurrence of the behavior to establish its relationship to the behavior (e.g., Anderson, Hawkins, & Scotti, 1997)” (p.3). Thus, any experimentation working under the guise of an *automatic negative* condition is prone to inaccurate conclusions.

Second, while negative emotions may be elicited by arranging environmental events in a functional analysis (e.g., Woods & Miltenberger, 1996), the level of aversiveness required to create an EO may not be acceptable from an ethical standpoint. Finally, as Scottie et al. (1994) state: “equating demands with stress does not allow one to disentangle the possible escape versus arousal reduction functions” (p. 733). In other words, a determination that target behaviours occur due to a history of task avoidance/escape or due to a history of anxiety attenuation *that results from having avoided/escaped aversive tasks* can not be made.<sup>1</sup>

### **Analysis of Treatment Components**

While the favorable outcomes we present point out that interventions can be developed which interrupt identified contingencies that maintain the occurrence of OCD-related behaviours, lack of a component analysis restricts definitive conclusions about the usefulness of each treatment element. Nonetheless, we suggest several possible explanations for our results.

First, we employed antecedent control procedures which focused on altering EOs rather than eliminating S<sup>D</sup>s in treating target behaviours. We considered this to be a more practical solution as in Rachel’s case eliminating S<sup>D</sup>s would have required taking countless items and her mother out of her immediate environment when reinforcement was valued, as both items and people were discriminative stimuli for problem behaviour. Furthermore, as “removing the S<sup>D</sup> for

the problem behavior does not alter the conditions that motivate the client to engage in the behavior” (Miltenberger, 2005, p.6) we did not anticipate long-term success through such a strategy.<sup>2</sup>

While the contribution of extinction was not determined, we believe it to have been a central component to the success of intervention. Albeit preliminary, treatment results support previous literature indicating the need to match extinction procedures to the function of problem behavior; a task which would be less probable and more susceptible to errors had functional analysis not initially been conducted.<sup>3</sup>

Lastly, our use of differential reinforcement in the treatment of OCD-related behaviours merits discussion. Our results suggest that the frequent provision of attention during VM-DRO altered establishing operations for the target behaviour. Our results also indicated that VI-DRO and DRL provided consequences that effectively competed with the automatic positive reinforcement potentially obtained by the compulsions (i.e., tokens and back-up reinforcers competed with Au+ / self-stimulation). This hypothesis is predicated on comments Rachel reportedly made each time she hoarded during treatment. According to her mother, Rachel adamantly said any papers she had “mistakenly” brought home could be immediately thrown in the trash upon realization that a token would not be received. Likewise, Rachel was inconspicuously observed hurriedly collecting and replacing numerous paper items on several occasions during treatment. Finally, this author also witnessed Rachel independently returning packed belongings to her car after reinforcement contingencies were stipulated during rule rehearsal. These highly uncharacteristic behaviours suggest that tokens earned during DRO and DRL eventually became more valued than either form of automatic reinforcement potentially produced as a consequence of hoarding or packing.<sup>4</sup>

Use of DRL also involved a tolerant approach which allowed for a reduction in response rates, rather than a complete, unrealistic elimination of the packing behaviour (given that some items are in fact required when leaving ones home such as toiletries and/or a wallet). Such flexibility is believed to have aided in treatment effectiveness as pre-treatment observations suggested that expecting the participant to stop packing obvious necessities would result in increased problem behaviour (e.g., verbal outbursts) and create added stress for the parent.

**Conceptualization of behavioural processes: Impact on treatment selection.**

The decision to utilize extinction rather than exposure and response prevention (ERP), a procedure included in customary CBT treatments for OCD (March & Mulle, 1998), is considered to have been integral in creating treatment efficacy. While ERP involves exposing the individual to specific environmental variables (imagined or in vivo) and preventing associated compulsive behaviours thereby allowing habituation to anxiety to occur (March & Mulle, 1998), extinction does not prohibit aberrant behaviour from taking place. This difference was deemed significant, as we hypothesized that prohibiting Rachel from collecting desired items (response prevention) may have required physical blocking, resulting in negative outcomes such as interference by others in the environment, marginalization of persons with exceptionalities, inconsistent implementation, and provision of intermittent reinforcement. We also hypothesized that Rachel's cognitive functioning and ASD characteristics would impede use of graduated ERP (i.e., desensitization), an alternative to response blocking recommended by March and Mulle (1998) for the treatment of pediatric OCD or severe cases. Alternatively, positive outcomes were realized by withholding attention contingent upon target behaviours.

Additionally, while the demonstrated effectiveness of ERP has been reported in ABA literature (Wetterneck & Woods, 2006), a behavioural analysis of the procedure reveals

incongruence with current conceptualizations of discriminative and motivational properties of antecedent events. As Michael (1982) describes, the distinction lies in whether environmental variables make reinforcement more available ( $S^D$ s), less available ( $S^{\Delta}$ s), more valued (EOs), or less valued (abolishing operation; AO) at any given time. Although distressing emotions (e.g., anxiety, obsessive thoughts etc.) establish automatic negative reinforcement as being valued, present methodologies can not manipulate or measure internal stimulation. Thus, while  $S^D$ s for compulsive behaviour can be presented, verification that an individual is to 'exposed' to an EO during ERP can not be made, especially when the source of the anxiety is unknown. This appears particularly evident in relation to hoarding, given current controversy involving its classification as an anxiety disorder.

### **Subjective Measures of Treatment Effectiveness**

Post-treatment administration of the COIS-RP (Piacentini et al., 2007) revealed a clinically significant improvement evidenced by a 68% decrease in symptom severity. Conversely, pre-post administration of the CY-BOCS (Goodman et al., 1986) showed zero change and thus an amendment to OCD severity was not made (i.e., Rachel was assessed as having high-moderate OCD both before and after intervention). An obvious explanation is that post-treatment responses were related to behaviours previously not rated. As the CY-BOCS generates OCD severity scores based on a child's four most troublesome behaviours at any given time, we emphasize that it did not reflect improvements that indeed occurred for the targeted behaviours. Instead, post-treatment scores represent the addition of two newly identified behaviours (having only one food visible at a time and confessing minor things) which substituted hoarding and packing, given that problems associated with hoarding and packing had been resolved. <sup>5</sup>

As indicated, pre-and-post administrations the PSI-SF (Abidin, 1995) failed to reveal ideal improvement in parental stress, with the parent remaining in the same percentile throughout this research. Even so, given the high level of parent involvement (i.e., conducting functional analysis, implementation of all treatment components, and frequent collection of objective data) a lack of increase in stress noteworthy. Such consistency suggests that parents may play an active role in the assessment and treatment of their child's problem behaviour without inevitably experiencing more stress. Improvements in quality of life (Feldman et al., 2002) relating to hoarding and packing, and a reported high level of consumer satisfaction (Feldman et al., 2002) attest to the clinical significance of this research.

### **Discussion of Follow-up Results**

On-going weekly probe data revealed that treatment benefits maintained during two months of follow-up. This is particularly interesting as treatment fading and follow-up data began in the fall which; reportedly a very stressful time of year for Rachel. Although parent interviews indicated that starting school each autumn typically corresponds with increased anxiety for Rachel and the onset of problem behaviours (e.g., packing, sleepless nights, repeated questioning, and crying outbursts), increases in treated target behaviours did not occur.<sup>6</sup>

While hoarding (collecting *and* saving) did not occur during follow-up, parent information revealed that Rachel periodically *collected* items during excursions when treatment terminated. Rachel's mother also indicated, though, that the family did not consider 'collecting' behaviour to be problematic as: a) it rarely occurred; b) Rachel discarded items with ease (sometimes independently and sometime requiring minimal prompting such as an expectant look or a gesture to a garbage can from her mother); and c) limited play skills prohibited Rachel from engaging in alternative behaviours to 'pass the time' during extended events (e.g., Rachel was

encouraged to collect leaves, stones, flowers etc. during her brother's two hour football practices). Although family time constraints prevented teaching Rachel alternative play behaviours, we suggest that differential reinforcement of alternative behaviour (DRA; withholding reinforcement for unwanted behaviour while simultaneously reinforcing a specific, alternative response Cooper et al., 2007) may be an important element in the treatment of hoarding behaviours particularly with regards to long-term maintenance and recommend future research (e.g., Sigafos et al., 2009). On-going monitoring of collecting was recommended to facilitate intervention should problematic increases occur.

### **Limitations**

Limitations to the presented research warrant mention. First, our results should be viewed as preliminary due to the single case nature of the studies and the idiosyncratic variables associated with the participant. Second, only one family member (Rachel's mother) participated in assessment and treatment. As baseline data and initial interviews indicated that Rachel spent most of her time with her mother, assessment measures were conducted with her mother alone. Further investigations (e.g., running analogue conditions, completing questionnaires etc.) conducted with her father, brother, and extended family may have revealed dissimilar results such as escape from demand or access to tangible reinforcement.<sup>7</sup> Third, biases may exist in relation to subjective measures of treatment effectiveness given that Rachel's mother was clearly aware of the purpose of the studies; measures of symptom severity (CY-BOCS, COIS-RP), parental stress (PSI-SF), and quality of life have potential response distortions. On the other hand, the use of objective data collection procedures and corresponding interobserver reliability checks may in part compensate for any biased conclusions that exist. Fourth, as the participant was not taught to use competing behaviors such as self-talk or rule rehearsal while suppressing

hoarding and packing, it is unclear exactly what specific behaviours were being strengthened through DRO and DRL. It is notable however, that on several occasions Rachel reminded others to read the rules aloud to her prior to entering a facility where preferred paper products may be available for collecting. This response suggests that Rachel may have been covertly engaging in intraverbal behaviour during excursions (i.e., self-prompts to refrain from hoarding) despite never being directly asked to recite or describe the rules. Fifth, as a component analysis was not conducted the usefulness of each aspect of treatment can not be assessed. Future studies which investigate the effects of individual treatment components may provide additional insight into how to best treat OCD-related behaviours associated with various functions. Finally, the effects of treatment were demonstrated through use of a multiple baseline design. As Baer, Wolf, and Risley (1968) indicate this technique 'may be of particular value when a behavior appears to be irreversible or when reversing the behavior is undesirable. The effects of intervention are said to be demonstrated when a number of responses are identified and measured over time to provide baselines against which changes can be evaluated' (p. 94). While such outcomes were evident in the presented research, independent variable effects should not be overestimated as only two baselines were sequentially analyzed (with slight variation among them; DRO vs. DRL).

### **Implications**

This research has several implications. First, it is the only known study investigating the use of functional analysis in identifying operant functions of OCD-related behaviours in an individual with ASD. While at least one other study has used functional analysis to reveal operant functions of OCD vocalizations (May et al., 2008), potential causes of OCD-related behaviours in persons with ASD have not been researched via experimental manipulations to date. As such, results of this investigation contribute to the scarce research revealing that

socially mediated reinforcement may be a maintaining variable of behaviours displayed by this population traditionally considered to be maintained exclusively by automatic contingencies (Fischer-Terworth & Probst, 2009). In so doing, this research suggests that over-pathologization of such behaviour may be unnecessary, thereby potentially circumventing comorbid diagnoses for persons with ASD.

Second, this research demonstrates that the use of a function-based intervention package stemming from enhanced assessment methodology can effectively reduce OCD-related behaviours. Thus, pre-intervention assessment of behavior-environment interactions associated with OCD-related behaviours may provide some empirical basis for negating the use of standardized treatment approaches.<sup>8</sup>

Third, in teaching the parent to conduct the functional analysis, this research adds to existing literature investigating the accuracy and feasibility of parent involvement. With IOA confirming 100% parental adherence to assessment measures this research substantiates that people with limited clinical experience may be taught to effectively utilize functional analysis procedures (Iwata et al., 2000), with adequate professional guidance (Behavior Analyst Certification Board, BACB, 2010). In doing so, the extension of functional analysis beyond research settings to clinical and natural environments is further promoted.

Similarly, our focus on parent participation in assessment and treatment highlights that parent involvement facilitates understanding of the ways in which significant others may contribute to OCD-related behaviours. For example, after successively conducting an *attention* condition and an *alone* condition, Rachel's mother commented: "it's really interesting to see how she (Rachel) responds differently when I'm around or not." Also, after being instructed to withhold attention for the occurrence of hoarding and packing as part of treatment (i.e.,



extinction), Rachel's mother stated: "others are still paying attention to it (hoarding/packing) so it's still happening with them." Although causal relationships have not been previously empirically identified, extant literature indicates that over 88% of relatives accommodate a family member's OC symptoms (Calvacoressi et al., 1995) and that parental criticism and anger are predictive of OCD relapse (Steketee, 1993). Our favorable results therefore endorse active parent participation in attempting to reduce aberrant behaviour and support maintenance over time.

### **Directions for Future Research**

Several areas of future research are recommended. First, given the identified comorbidity between OCD behaviour and ASD, future studies investigating the usefulness of ABA procedures such as those included in this research, are encouraged. Such investigations may reveal alternative interventions for treating OCD behaviour displayed by individuals with limited language skills who may not benefit from CBT. Direct comparisons between CBT and function-based intervention are also recommended. Likewise, as hoarding is often resistive to popular OCD treatments (Mataix-Cols et al., 2002; Abramowitz et al., 2003; Steketee & Frost, 2003), we encourage future research of function-based interventions for hoarding by persons with and without a dual ASD diagnoses.

Future studies should continue to explore the use of functional analysis in the identification of operant functions associated with OCD and other socially important phenomenon. Alternatively, studies involving the creation of reliable and valid indirect assessments designed specifically for OCD may prove beneficial when experimental manipulations are not feasible. Finally, future research investigating innovative adaptations to

current functional analysis methodology may further extend its use and the science of behaviour analysis as a whole.

### **Conclusion**

Fictional explanations of behaviour, including compulsive hoarding behaviours categorized as OCD, have been erroneously generated within the psychological community and accepted by the general population. Concluding that behaviour occurs because of a 'need' or 'drive' is fictional and explains nothing (Wyatt, 2001). Instead, empirical investigation such as we present may reveal sequenced combinations of EOs, S<sup>D</sup>s, and SR +/- that accurately account for behaviour occurrence: "the best way to dispose of any explanatory fiction is to examine the facts upon which it is based. These usually prove to be, or suggest, variables which are acceptable from the point of view of scientific method" (Skinner, 1953, p. 285).

As Mace et al. (1988) assert: "without an empirical understanding of the variables controlling aberrant behavior, the researcher/clinician is faced with selecting treatments on the basis of a subjective analysis, or combining several intervention elements that have a history of effectiveness with similar problems" (p. 296). In its use of functional analysis, the presented research provides an experimentally validated explanation for the occurrence of OCD-related behaviours displayed by an individual with ASD. Thus, a capricious reliance on potentially misleading subjective analysis and utilization of prescriptive treatment approaches for such aberrant behaviour was circumvented. Based on these study results, we advocate use of functional analysis procedures (guided by indirect assessment) in assessing and treating OCD-related behaviour such as hoarding.

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## Footnotes

<sup>1</sup> Debatably, participant reports of anxiety levels (and excitement / stimulation levels) similar to those utilized in popular CBT treatments and in previous studies (Woods & Miltenberger, 1996) could be incorporated; however, such measures are highly subjective, prone to biases, and prohibit objective verification (Miltenberger, 2005). Additionally, regular observations and parent interviews concluded that use of such rating scales or personal reports of anxiety levels would not be feasible given Rachel's limited cognitive and communication abilities. Any conclusion of either maintaining variable (escape or arousal reduction) having resulted from functional analysis incorporating indirect assessments would be a misguided assumption at best (Iwata, 2009).

That is not to say that behaviour analysis denies the existence of unobservable private events rather it surmises that such things have limited causal status. As Skinner (1953) asserts:

Emotions are not causes...as long as we conceive of the problem of emotion as one of inner states we are not likely to advance a practical technology. It does not help in the solution of a practical problem to be told that some feature of a man's behaviour is due to frustration or anxiety; we also need to be told how the frustration or anxiety has been induced and how it may be altered (p.167).

Therefore, according to Skinner's philosophical and theoretical foundation it is erroneous to explain such things as physical aggression by saying 'anger caused it' or to explain OCD behaviours such as repeated checking or hoarding by saying 'he is anxious.' Such explanations merely result in circular reasoning and leave us having to explain the origins of the anger or anxiety (Wyatt, 2001). In acknowledging mainstream psychology's reliance on mentalistic explanations and negligible consideration of contributing environmental variables to explain human behaviour (Anderson et al., 1997) we concur with Friman, Hayes and Wilson's (1998) assertion that, "relinquishing anxiety to mainstream psychology virtually guarantees that proper

analyses of functional relations between environment and behavior, the metier of behavior analysts, will not be conducted (p 153).” While we acknowledge that a resulting bias may exist based on our initial choice of analog scenarios, our investigation of operant functions is nonetheless advantageous as the propensity to rely on hypothetical constructs as explanations for OCD-related behaviour was avoided. Like Scotti et al., (1994) we consider this deviation to be an advancement for ABA as the “the tendency in the developmental disabilities literature to report only the most informal consideration of controlling variables (i.e., anecdotal reports) without independently testing and ascertaining the validity of the hypotheses does not bode well for standards of practice in this field” (p. 734). Consequently, on-going study of the conditions that occasion OCD-related behaviours from a behaviour analytical perspective is merited.

<sup>2</sup> We deduced that the combined use antecedent strategies (social stories and rule rehearsal) altered the value of hoarding and packing thereby contributing to treatment effectiveness. As both the social story and rules indicated that tokens and back-up reinforcers would be provided for meeting response criteria, it is plausible that these tools in some way abated an existing establishing operation (attention deprivation or sensory deprivation/satiation) by identifying the availability of reinforcers that were ultimately more preferred than the reinforcers attained via the aberrant behaviour (i.e., promise reinforcer; “*refrain from doing x and you’ll be rewarded with y which is better*”). As a result, target behaviours were abolished.

It also appears as though these two components may have served as response prompts to display desired behaviours (i.e., zero hoarding and minimal packing) when the delivery of contingencies would be postponed. As Cooper et al., (2007) indicates, “delayed consequences can help exert control over behaviours performed hours and even days before if they are associated with and linked by verbal behaviour to the rule or to interim token reinforcers” (p.

553). Given the topography of Rachel's behaviours, we also believed this to be an essential component to treatment effectiveness and long-term maintenance as employing an immediate, rich schedule of tangible reinforcement would likely have resulted in replacing the abundant acquisition of non-appropriate items (e.g., hoarding scraps of paper) with the abundant acquisition of more socially acceptable items. Such excessive collection of items, regardless of their appropriateness or how they were attained, would have provided little, if any, added value for the family. Instead, the accumulation of items was minimized and treatment benefits were realized through the use of social stories and rules which specified that terminal reinforcers would be provided at a later date contingent upon the absence of target behaviours.

The inclusion of these strategies also facilitated treatment fading during our involvement with the family (e.g., reading stories and rules less often). Future treatment fading may also be possible, such that their implementation may ultimately be more sustainable for the family.

The application of variable-momentary differential reinforcement of other behaviour (VM-DRO) is also thought to have significantly contributed to treatment effectiveness. Akin to typical applications, our use VM-DRO involved the delivery of reinforcement at the end of a variable time-based schedule (VM – 2 minutes) so long as problem behaviours were not occurring and withholding identified reinforcement contingent upon target behaviours (extinction). As momentary schedules can result in higher rates of reinforcement than traditional fixed-interval schedules (Lindberg et al., 1999), it appears that the frequent provision of attention may have successfully altered the response–reinforcer contingency for at least one of two identified reinforcers and abated an establishing operation (deprivation of attention) that occasioned problem behaviours. In recognizing however, that only one maintaining variable was provided, we assume that a resulting satiation of attention may have altered states of motivation

significantly enough on its own so as to contribute to a reduction in target behaviours maintained by both attention *and* automatic reinforcement.

Finally, observations of the use of VM-DRO suggested that it was easy to implement as the frequent delivery of attention involved situations of naturally occurring social exchanges and it did not require continuous monitoring (i.e., did not require a great deal extra effort by the parent).

<sup>3</sup> Copious research has illustrated the effect of matching the function of aberrant behaviour to the specific type of extinction utilized (Day et al., 1988; Iwata et al., 1994; Richman et al., 1998). For example, Day et al., conducted functional analyses on the self injurious behaviours (SIB) of three people with moderate to intellectual disability. With assessment data indicating that SIB was maintained by social positive contingencies for two of the participants and sensory input for the third participant, corresponding treatment plans were implemented which attempted to replace SIB with functionally equivalent responses. Specifically, in the cases in which SIB was maintained by social positive reinforcement in the form of adult attention, treatment consisted of removing attention with each occurrence of SIB (extinction) and teaching alternative communicative responses (i.e., manding). In the case in which SIB was maintained by self stimulation, treatment consisted of a mild restraint and differential reinforcement of incompatible behaviour (DRI; noninjurious stereotypy of hand-waving). Having attained positive treatment results, Day et al., (1988) indicate that ‘understanding the motivation of the response may assist the clinician in providing more efficient treatment interventions and may preclude interventions that are unlikely to be successful because they fail to address the basic function of the response’ (p. 588).

Richman et al. (1998) further support the practice of harmonizing functionality and extinction procedures in their research involving one individual diagnosed with profound intellectual disability and autism. After identifying that the participant's disruptive and SIB behaviours were separately maintained by escape and automatic reinforcement respectively, treatment was introduced. As SIB (skin picking) occurred continuously, intervention initially involved use of escape extinction for both behaviours simultaneously (i.e., escape extinction was used for SIB although functional analysis revealed it to be an irrelevant extinction procedure). Although disruptive behaviours diminished, decreases in SIB occurred only when functionally specific sensory extinction (finger blocking) was utilized.

Finally, parallel conclusions are expressed in the work of Iwata, et al., (1994) in which three participants with mental retardation and SIB were treated through use of at least two functional variations of extinction after having been first exposed to four analogue conditions. With suppression of SIB occurring only when the maintaining reinforcement contingency was terminated for all three participants, their results illustrate that matching the function of aberrant behavior to the related form of extinction is essential to treatment effectiveness. Iwata et al.'s, affirmation that a single behavioural principle designed for a behaviour serving one function "may have little or no therapeutic effect on the same behaviour serving a different function" (p. 133) highlights the need for behaviour specific assessment procedures, such as those utilized in the presented studies. While the type of extinction we employed was the same for hoarding and packing (i.e., withholding attention or terminating it contingent on the occurrence of either target behaviour), the *form* of extinction used with these topographically similar behaviours would have been different if assessment results deemed it necessary.

<sup>4</sup> Current research by Himle, Woods, and Bunaciu (2008) evaluating the role of contingencies in differentially reinforced omission of behaviour is relevant to our studies. In comparing tic frequency during conditions of no suppression (baseline), suppression instructions plus DRO, and suppression instructions plus NCR, Himle et al. demonstrated that tic frequency could be reduced when reinforcers are provided for tic free periods and that the noncontingent delivery of tokens did not reliably suppress tics. Thus, their results showed that the contingency within DRO may be responsible for the suppression of problem behaviour. Likewise, we suppose that the contingencies associated with our use of DRO and DRL contributed to overall behaviour reductions and that providing NCR alone would have been less successful.

<sup>5</sup> Disparity among subjective assessment results validates our position that such measures should not be utilized as a sole indicator of OCD. In failing to objectively evaluate antecedents and consequences associated with aberrant behaviour these measures provide only general insight regarding symptom duration, frequency, and severity (Lee & Miltenberger, 1997). Thus a complete reliance on such tools may result in behaviour misrepresentation and/or implementation of ineffective treatments. Alternatively we encourage the use of direct behaviour observations and data collection to facilitate functional classification and treatment of 'behaviours' rather than diagnostic categories.

<sup>6</sup> Inferences can be drawn from follow-up results in relation to parental assumptions about the presence or influence of anxiety. Although not empirically confirmed, it is plausible that the impact of anxiety on Rachel's hoarding and packing behaviour may have been overrated. Similar to Miltenberger et al.'s (1998) research of hair pulling, anxiety may not have been an establishing operation for hoarding or packing behaviour from the outset of this research. Second, it is possible that treatment effectively terminated the antecedent-response-reinforcer



contingency as intended: NCR abated an EO for social positive reinforcement while acting as an arbitrary reinforcer for automatically maintained behaviours (Fischer, et al., 1997), extinction prohibited access to reinforcement for target behaviours, and differential reinforcement (DRO and DRL) effectively competed with identified reinforcers.

<sup>7</sup> Anecdotally, it would appear that attention from people other than Rachel's mother affected target behaviours. For example, three consecutive days with zero occurrences of hoarding were documented immediately following the introduction of treatment carried out by Rachel's mother; however hoarding occurred on the subsequent two days when Rachel reportedly went on excursions with her aunt and grandmother respectively. Descriptions of the events preceding the collection of items revealed that Rachel incessantly asked her relatives about taking available papers before eventually being told "yes, go ahead and take a few," thus suggesting a social positive component. Increased efforts to teach significant others about the role they may play in the maintenance of OCD-related behaviours and how to carry out treatment steps may have been useful in attaining further reductions in problem behaviour while jointly minimizing the provision of intermittent reinforcement.

<sup>8</sup> Although OCD already has an empirically supported treatment; namely CBT (Rosa-Alcàzar, Sanchez-Meca, Gómez-Conesa, & Marin-Martinez, 2008), these results broaden treatment options. Alternative interventions developed from improved assessment may be helpful for individuals with dual diagnosis and/or limited cognitive abilities (i.e., who may not benefit from an essential component of CBT which involves identifying distorted thinking, understanding behaviours from a neurobehavioral framework etc. known as cognitive therapy; (March & Mulle, 1998) and provide minimally intrusive treatment options (e.g., utilizing extinction and differential reinforcement as a substitute to ERP; March & Mulle).

## Appendix A

## Ethics

Consent Form:

**Research Project Title:** Functional Analysis and Treatment of OCD-related behaviour in a Child with Autism Spectrum Disorder

**Principal Investigator:** Heather Sheen (Brock University)

**Co-Investigators:** Dr. Tricia Vause and Dr. Maurice Feldman (Brock University)

**Sponsor of Research:** Brock University

\*This research is supported an initiative awarded from The Provincial Centre of Excellence for Child and Youth Mental Health at The Children's Hospital of Eastern Ontario.

This description, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

**What is the purpose of the study?**

For children with Autism who also have a diagnosis of Obsessive-compulsive disorder (OCD), we are interested in understanding more about what types of assessment and treatment techniques are helpful in reducing OCD symptoms. We are interested in testing out an assessment methodology that has been helpful in understanding other anxiety and behavioural issues in child populations (including children and youth with autism) and in developing effective interventions. Each child in the study will be provided with an individualized treatment program that is modified to take into account his or her unique profile/characteristics, and involves his or her parent(s) through all steps of the process. The protocol may prove to be useful in reducing OCD symptoms to manageable levels, and, in turn, improving both the child and parents' quality of life.

**What does the project consist of and how long will the study take?**

If you give consent for your child to take part in this project, the primary researcher will:

- Meet with you and your child, and spend one or two 30 min sessions to develop rapport and get to know you
- Conduct indirect assessments (e.g., semi-structured interviews that provide us with information concerning your child's behaviours, a series of questionnaires such as a Quality of Life questionnaire) and direct assessments (e.g., observations of behaviours as they occur in clinical or natural settings). The tests that involve yourself and your child will be conducted in order to gather information regarding diagnoses, intellectual, and adaptive functioning. You will also be asked to keep track of OCD symptoms that are identified and defined throughout the study.
- Schedule approximately one hour sessions at your convenience, once per week for a total of 12 to 20 sessions. Sessions will involve a) functional assessment methods and b) treatment implementation. Assessment will involve exposing your child to a series of conditions designed to elicit OCD-related behaviors to allow for a better understanding of why such

behaviour(s) occur. This process will also involve a brief period of parent training and on-going guidance as we ask that you conduct this segment of the study in an attempt to better replicate typically occurring situations. Parent training in assessment techniques will include a description of the methodology, modeling, role play and feedback. Treatment, based on assessment results will generally include: (a) manipulating social and environmental events to minimize the occurrence of problem behaviour; (b) withholding typical consequences for the behaviour(s); and (c) teaching more appropriate alternative responses. Once again, as we require parents/guardians to be actively involved in the treatment process adequate training and guidance will be provided.

**What personal information of my child will be accessed by the research staff?**

The researcher will access (if applicable) the following information from each parent: the age, diagnosis, level of functioning, previous intellectual and adaptive behavior assessments, previous psychological assessments, and use of/change in medication.

**Will my child's personal information be kept confidential?**

All information will be kept confidential and stored in a locked office. Only the research staff will have access. Any presentations, reports, or publications about the project will not contain any identifying information, unless you give permission to the researchers to show video clips of your child. The information will be kept indefinitely, and will only be used for educational purposes.

Videotaping of sessions will take place to ensure treatment integrity and for purposes of data collection. Videotapes will be viewed by project staff only, and will be kept in a locked office. On some occasions, research staff will observe the session through a one-way mirror, in order to observe the assessment and treatment, as well as to collect data in order to ensure that the treatment is being implemented accurately.

**What are the risks and benefits in taking part in the study?**

Generally, the procedures used in this study present no risks to your child beyond what you might encounter in everyday activities. When certain procedures are introduced, it is possible that there may be a short-term increase in the targeted behaviours or anxiety. However, in the long-term, it has been shown that exposure to these procedures has led to a reduction in symptoms. Participants will benefit directly in that we will determine what OCD symptoms your child presents with, and conduct an individualized assessment and intervention with the goal of symptom reduction, and an increase in quality of life for you and your family.

**Will I receive the results of the study?**

If you wish to have a written description of the results, please check YES in the appropriate box at the end of this form and we will send you a summary of the purpose of the study, general findings, as well relevant information concerning your child within 3 months after the completion of the study.

**Is there any payment or cost for participating?**

No. There is no payment or cost for participating in this research project.

**Is participation voluntary?**

Participation is voluntary. Whether you give consent for your child to take part in the study will in no way affect any services that you or your child may be receiving now or in the future. Moreover, even after you give consent, you can stop any time and for any reason by simply calling the principal investigator listed at the end of the consent form.

Last, the cooperation of your child to continue in this study (e.g., their willingness to come with you to a session and to work with the research project staff) will be monitored throughout the study. If at any time your child does not want to participate, that decision will be respected and the session will be cancelled/rescheduled. If you feel that your child is unable to communicate this to us, we will rely on you to let us know if and when to stop the sessions. If this happens on a continual basis (e.g., several times in a row), we will accept this as a possible indication that your child does not wish to continue and will discontinue his or her participation from the project. Of course, we will discuss this with you before the decision is made.

### **Will I be contacted in the future for other studies?**

The results of this research may lead to other related studies in the future that may be beneficial to your child. Please check the appropriate box at the end of this form if you would like to be contacted directly by the researchers in the future about other studies.

### **Signing the Consent Form**

Signing the following page of this *Project Description and Consent Form* indicates that you have understood to your satisfaction the information regarding participation in the research project and agree for your child to participate. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and/or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. This study has received ethics clearance through REB file # 09-061. The Research Ethics Officer can be contacted at mailto: [reb@brocku.ca](mailto:reb@brocku.ca) or (905) 688-5550 ext. 3035, and can provide responses to questions about the research participant's rights.

**Principal Investigator: Heather Sheen Phone: (416) 571- 8910**

### **Signatures**

I \_\_\_\_\_, hereby:

**(Parent/Guardian – please print your name)**

consent to my participation and my child's participation in completing direct and indirect assessments.

consent to \_\_\_\_\_'s participation in this study.

**(please print child's name)**

By giving consent I allow the research project staff to:

- Work with me and my child in weekly one-hour sessions for 12 to 20 weeks.
- Conduct developmental and adaptive functioning assessments that involve me and my child.
- To obtain personal information, including age, diagnosis, level of functioning, previous intellectual and adaptive behavior assessments, and previous psychological assessments.
- Videotape my child, in order to ensure treatment integrity, for purposes of data collection, and to show clips for educational purposes at talks and conferences for parents, students, and professionals. The raw footage of the videotapes will be viewed by project staff only, and will be kept in a locked office. The videos will be kept indefinitely, but will to be used for educational purposes only.
- Include my child's results in publications, reports, and talks, so that others may learn from this project.

I understand that I can revoke or amend this consent at any time and for any reason. The consent will otherwise remain in effect for a period of 12 months from the date it is received.

<i>Please check YES or NO for the following items:</i>		<b>YES</b>	<b>NO</b>						
<input type="checkbox"/> I would like to receive the results of this study.									
<input type="checkbox"/> I allow the researchers to share my child's results with authorized staff.									
<input type="checkbox"/> I allow the video clips of my child to be shown for educational purposes at talks and conferences (see above for details)									
<input type="checkbox"/> The researchers may contact me directly for possible future related studies.									
<table style="width: 100%; border: none;"> <tr> <td style="width: 35%; border-top: 1px solid black; border-bottom: 1px solid black;">Signature of Parent/Guardian</td> <td style="width: 65%; border-top: 1px solid black; border-bottom: 1px solid black;">Date</td> </tr> <tr> <td style="border-top: 1px solid black; border-bottom: 1px solid black;">Name of Researcher/Delegate</td> <td style="border-top: 1px solid black; border-bottom: 1px solid black;">Signature of Researcher/Delegate</td> </tr> <tr> <td></td> <td style="border-top: 1px solid black; border-bottom: 1px solid black;">Date</td> </tr> </table>				Signature of Parent/Guardian	Date	Name of Researcher/Delegate	Signature of Researcher/Delegate		Date
Signature of Parent/Guardian	Date								
Name of Researcher/Delegate	Signature of Researcher/Delegate								
	Date								

Please return all 4 pages of this *Project Description and Consent to Participation Form* in the enclosed stamped envelope to the principal investigator. Keep the extra copy for your records. Thank you for cooperation.

Assent Form:

**Research Project Title:** Functional Analysis and Treatment of OCD-related behaviour in a Child with Autism Spectrum Disorder

**Principal Investigator:** Heather Sheen (Brock University)

**Co-Investigators:** Dr. Tricia Vause and Dr. Maurice Feldman (Brock University)

**Sponsor of Research:** Brock University

\*This research is supported an initiative awarded from The Provincial Centre of Excellence for Child and Youth Mental Health at The Children's Hospital of Eastern Ontario.

This description, a copy of which will be left with you, will tell you what the research is about if you decide that you would like to be part of it. If you have questions or would like more of an explanation about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this, and to understand any other information that is given to you.

**What is the purpose of the study?**

We are interested in understanding more about what types of assessments and treatments might be helpful in reducing your worries, uncomfortable thoughts, or behaviors that you feel that you have to do. You will be provided with an assessment and treatment program that takes into account your needs, and your parent(s) will be involved throughout all steps of the process. The protocol may prove to be useful in reducing thoughts and things you feel that you have to do that may bother you, and, in turn, improving both you and your family's quality of life.

**What does the project consist of and how long will the study take?**

If you decide you would like to take part in this project, the primary researcher will:

- Meet with you and at least one parent, and spend one or two 30 minutes meetings getting to know you and your parent(s)
- Ask you questions about your life and about your fears, worries or behaviors that you feel you have to do. These questions will be asked in order to better understand how we can help you. Also your parent will be asked to keep track of behaviors that you would like to stop doing.
- Schedule one hour sessions at you and your parent's convenience, once or twice per week for a total of 12 to 20 sessions. These sessions will involve the following: (a) learning more about why these behaviours occur (b) changing things around you to reduce their occurrence, (c) changing events that usually happen after the behaviours (d) teaching you new behaviours that are not as troubling. Altogether, we estimate the study will take about 35 hours of you and your parent's time.

**What personal information of mine will be accessed by the research staff?** The researcher will access (if applicable) the following information: your age, diagnosis, previous assessments related to how you are doing in general (in school, home, etc.), and use or/change in medication.

**Will my personal information be kept confidential?**

All information will be kept private and stored in a locked office. Only the research staff will have access to your personal information. Videotaping of sessions will take place to ensure everything is running smoothly and to see if you are in fact benefiting from the treatment.

Videotapes will be viewed by project staff only, and will be kept in a locked office. Any presentations, reports, or publications about the project will not contain any identifying information, unless you give permission to the researchers to show video clips of you. The information will be kept indefinitely, and will only be used for educational purposes.

On some occasions, research staff will observe the session through a one-way mirror, in order to observe the assessment and treatment, as well as to collect data in order to ensure that the treatment is being implemented accurately.

**What are the risks and benefits in taking part in the study?**

Generally, the procedures used in this study present no risks to you beyond what you might encounter in everyday activities. When certain procedures are introduced, it is possible that there may be a short-term increase in worry, stress or behaviours. However, in the long-term, it has been shown that exposure to these procedures has been helpful. You will benefit directly from this study in that we will determine what bothersome behaviours are present, and will teach you ways to stop doing these behaviours, while learning new skills. In the end, we hope you will be better able to manage your worries, feelings and behaviours which will hopefully make things easier on you and your family.

**Will I receive the results of the study?**

If you wish to have a written description of the results, please check YES in the appropriate box at the end of this form and we will send you a summary of the purpose of the study, general findings, as well relevant information concerning your individual performance within 3 months after the completion of the study.

**Is there any payment or cost for participating?**

No. There is no payment or cost for participating in this research project.

**Is participation voluntary?**

Participation is voluntary. Whether you agree to take part in the study will in no way affect any services that you may be receiving now or in the future. Moreover, even after you give consent, you can stop any time and for any reason by simply calling the principal investigator listed at the end of the consent form.

Last, if at any time during the study you do not want to participate, that decision will be respected and the session will be cancelled/rescheduled. If this happens on a continual basis (e.g., several times in a row), we will accept this as a possible indication that you do not wish to continue and will discontinue participation in the project. Of course, we will discuss this with you before the decision is made.

**Will I be contacted in the future for other studies?**

The results of this research may lead to other related studies in the future that may be beneficial to you. Please check the appropriate box at the end of this form if you would like to be contacted directly by the researchers in the future about other studies.

**Signing the Consent Form**

Signing the following page of this *Project Description and Consent Form* indicates that you have understood to your satisfaction the information regarding participation in the research project and

agree to participate. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and/or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. This study has received ethics clearance through REB file #: 09-061. The Research Ethics Officer can be contacted at mailto: [reb@brocku.ca](mailto:reb@brocku.ca) or (905) 688-5550 ext. 3035, and can provide responses to questions about the research participant's rights.

**Principal Investigator: Heather Sheen, Phone: (416) 571-8910**

**Signatures**

I \_\_\_\_\_, hereby:

(Child's name)

Assent to my participation in completing direct and indirect assessments.

By giving assent I allow the research project staff to:

- Work with me and my parent in weekly one-hour sessions for 12 to 20 weeks.
- Conduct developmental and adaptive functioning assessments that involve me and my parent.
- To obtain personal information, including age, diagnosis, previous intellectual and adaptive behavior assessments, and previous psychological assessments.
- Videotape me, in order to ensure treatment integrity, for purposes of data collection, and to show clips for educational purposes at talks and conferences for parents, students, and professionals. The raw video footage will be viewed by project staff only, and will be kept in a locked office. The videos will be kept indefinitely to be used for educational purposes only.
- Include my results in publications, reports, and talks, so that others may learn from this project.

I understand that I can revoke or amend this assent at any time and for any reason. The assent will otherwise remain in effect for a period of 24 months from the date it is received.

*Please check YES or NO for the following items:*

**YES NO**

• I would like to receive the results of this study.		
• I allow the researchers to share my results with authorized staff.		
• I allow the video clips of me to be shown for educational purposes at talks and conferences for parents, students and professionals.		
• The researchers may contact me directly for possible future related studies.		

\_\_\_\_\_  
**Signature of Participant**

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name of Researcher/Delegate

\_\_\_\_\_  
**Signature of Researcher/Delegate**

\_\_\_\_\_  
**Date**

Please return all 4 pages of this *Project Description and Consent to Participation Form* in the enclosed stamped envelope to the principal investigator. Keep the extra copy for your records. Thank you for cooperation.



Appendix B

CY-BOCS

**Children's Yale-Brown Obsessive-compulsive Scale (CY-BOCS)**

**Define Obsessions & Compulsions**

Before proceeding with the questions, define “obsessions and compulsions for the child and primary caretaker as follows:

*Obsessions* are thoughts, ideas or pictures that keep coming into your mind even though you don't want them to. They may be unpleasant, silly or embarrassing”

*Compulsions* are things you feel you have to do although you know that they do not make sense. Sometimes you may try to stop from doing them but this might not be possible.

**Procedure**

*Symptom Checklist:* after reviewing obsessions and compulsions, the interviewer should get a detailed inquiry about the child's obsessions and compulsions. This can be done by using the Compulsion Checklist and Obsession Checklist as a guide.

*Target Symptom List:* after the compulsion checklist is complete, list the four most severe compulsions on the Target symptom list.

*Severity Rating:* inquire about the severity of items: Time Spent, Distress, Resistance, Interference, and Degree of Control. Ratings for these items should reflect the interviewer's best estimate from all available information from the past week, with a special emphasis on Target Symptoms.

**Scoring:** all 19 items are rated but only 1-10 determine the total score.

**Target Symptom List for Obsessions**

Obsessions (describe, listing by order of severity, with 1 being the most severe, 2 second most severe etc.,)

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**QUESTIONS ON OBSESSIONS**

**1. Time Occupied by Obsessive Thoughts**

Question: *How much time do you spend thinking about these things? OR How frequently do these thoughts occur?*

<u>Time Spent on obsessions</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Extreme
		<1 hr a day	1-3hrs	>3 up to 8 hrs	>8hrs

**b. Obsession Free Interval**

Question: *On average, what is the longest amount of time each day that you are not bothered by obsessive thoughts?*

<u>Obsessive Free Interval</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Extreme
		>8 hrs	3-8 hrs	1-3 hrs	<1 hr

**2. Interference due to Obsessive Thoughts**

Question: *How much do these thoughts get in the way of doing things with friends? Is there anything you don't do because of them?*

<u>Interference</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Extreme
		Slight interference but still manageable	Definite interference	Substantial Impairment	Incapacitating

**3. Distress Associated with Obsessive Thoughts**

Question: *How much do these thoughts bother or upset you?*

<u>Distress</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Profound
		infrequent, not to disturbing	frequent, disturbing manageable	very frequent & disturbing	Near constant, disabling

**4. Resistance to Obsessions**

Question: *How hard to you try to stop the thoughts or ignore them?*

<u>Resistance</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Profound
		Tries most of the time	Makes some effort	Yields to all obsessions but is reluctant	Completely & willingly yield to all obsessions

**5. Degree of Control over Obsessive Thoughts**

Question: *When you try to fight the thoughts can you beat them? How much control do you have over the thoughts?*

<u>Degree of Control</u>	0	1	2	3	4
	Complete Control	Much Control	Moderate Control	Little Control	No Control

**Target Symptom List for Compulsions**

Compulsions (describe, listing by order of severity, with 1 being the most severe, 2 second most severe etc.,)

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**QUESTIONS ON COMPULSIONS**

**6. Time Spent Performing Compulsion**

Question: *How much time do you spend doing these things? OR How much longer than most people does it take to complete your usual daily activities because of these habits?*

<u>Time Spent</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Extreme

<1 hr a day      1-3hrs      >3 up to 8 hrs      >8hrs

**6b. Obsession Free Interval**

Question: *How long can you go without performing compulsive behaviour?*

<u>Obsessive Free Interval</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Extreme
	>8 hrs	3-8 hrs	1-3 hrs	<1 hr	

**7. Interference due to Compulsive Behaviours**

Question: *How much do these habits get in the way of doing things with friends? Is there anything you don't do because of them?*

<u>Interference</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Extreme
		Slight interference	Definite interference but still manageable	Substantial Impairment	Incapacitating

**8. Distress Associated with Compulsive Behaviours**

Question: *How upset would you feel if prevented from carrying out your habits? How upset would you become?*

<u>Distress</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Profound
		Only slight Anxiety	Anxiety but manageable	Disturbing Increase anxiety	Incapacitating

**9. Resistance against Compulsions**

Question: *How much do you try to fight the habits?*

<u>Resistance</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Profound
		Tries most of time	Makes some effort	Yields to all habits but is reluctant	Completely & willingly yields to all habits

**10. Degree of Control over Compulsive Behaviour**

Question: *How strong is the feeling that you have to carry out the habit? When you try to fight them, what happens? How much control do you have over the behaviours?*

<u>Degree of Control</u>	0	1	2	3	4
	Complete Control	Much Control	Moderate Control	Little Control	No Control

**11. Insight Into Obsessions and Compulsions**

Question: *Do you think your concern or behaviours are reasonable? What do you think would happen if you did not perform the compulsions? Are you convinced that something would really happen?*

<u>Insight</u>	0	1	2	3	4
	Excellent Insight Rational	Good insight but isn't completely Convinced	Fair insight, recognizes unreasonable	Poor insight, not unreasonable	Lacks insight behaviour is reasonable

**12. Avoidance**

Question: *Have you been avoiding doing anything, going any place, or being with anyone because of your obsessional thoughts or out of concern you will perform a compulsions? How much do you avoid?*

<u>Avoidance</u>	0	1	2	3	4
	None	Minimal Avoidance	Moderate Some	Severe Much	Extreme Avoidance

**13. Degree of Indecisiveness**

Question: *Do you have trouble making decisions about little things that other people might not think twice about (e.g., which clothes to put on in the morning; which brand of cereal to buy)? Exclude: ruminating thinking, ambivalence concerning rationally based difficult choices*

<u>Indecisiveness</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Extreme
		Some trouble but Minor	reports trouble	Continually weighs pros/cons	Unable to make decisions

**14. Over-valued sense of Responsibility**

Question: *Do you feel overly responsible for what you do and for the effects of your actions? Do you blame yourself for things that are not within your control?*

<u>Responsibility</u>	0	1	2	3	4
-----------------------	---	---	---	---	---

None	Mild	Moderate	Severe	Extreme
	Only mentioned	over-responsibility	deeply concerned	delusional sense
	Upon questioning	for events out	responsible for	of responsibility
		of control	events	

**15. Pervasive Slowness/Disturbance of Inertia**

Question: *Do you have difficulty starting or finishing tasks? Do many routine activities take longer than they should?*

<u>Slowness</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Extreme
		Delay	task usually	marked	unable to start &
			completed	difficulty	complete tasks without
			but late	completing tasks	assistance

**16. Pathological Doubting**

Question: *After you complete an activity do you doubt whether you performed it correctly? Do you doubt whether you did it at all? When carrying out routines do you find that you don't trust your senses (i.e., what you see, hear or touch?)*

<u>Doubting</u>	0	1	2	3	4
	None	Mild	Moderate	Severe	Extreme
		Only mentioned	clearly present	doubt effects	incapacitating
		when questioned	but manageable	performance	

**17. Global Severity**

Interviewers judgment of the overall severity of the patient's illness (consider the degree of distress reported by the patient, the symptoms observed and the functional impairment reported)

0	1	2	3	4	5	6
No illness	Slight	Mild	Moderate	Moderate-Severe	Severe	Extremely severe
	No functional	little	functions	Limited	functions	completely
	Impairment	functional	with	functioning	mainly with	non functional
		Impairment	effort		assistance	

**18. Global Improvement**

Rate total overall improvement present since the initial rating whether or not in your judgment is due to treatment.

0	1	2	3	4	5	6
Very much	Much	Minimally	No	Minimally	Much	Very much improved
Worse	worse	Worse	Change	Improved	Improved	

**19. Reliability**

Rate the overall reliability of the rating scores obtained. Factors that may affect reliability include the patient's cooperativeness and his/her natural ability to communicate. The type and severity of the obsessive-compulsive symptoms present may interfere with the patient's ability to concentration, attentions, or freedom to speak spontaneously (e.g., the content of some obsessions may cause the patient to choose his words very carefully)

0	1	2	3
Excellent	good	Fair	Very
No reason to	factors present	factors present	Low
Suspect	may adversely	definitely reduce	reliability
Unreliable	affect reliability	reliability	

## Appendix C

**Child OC Impact Scale - Revised (COIS - RP) Parent Report about Child**

Name: \_\_\_\_\_ Age: \_\_\_\_\_ Date: \_\_\_\_\_

Please rate how much your child's obsessive-compulsive symptoms (unwanted thoughts and/or rituals) have caused problems for him or her in the following areas over the past month. If a specific question does not apply, mark "Not at all".

0 = not at all 1 = just a little 2 = pretty much 3 = very much
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1. Taking tests or exams 0 1 2 3
2. Being with a group of strangers 0 1 2 3
3. Leaving the house 0 1 2 3
4. Going shopping or trying on clothes 0 1 2 3
5. Making new friends 0 1 2 3
6. Going to a friend's house during the day 0 1 2 3
7. Writing in class 0 1 2 3
8. Eating in public other than a restaurant, like on a picnic, in the park, or at a friend's house 0 1 2 3
9. Doing fun things during recess or free time 0 1 2 3
10. Getting to school on time in the morning 0 1 2 3
11. Going on a date 0 1 2 3
12. Visiting relatives 0 1 2 3
13. Getting ready for bed at night 0 1 2 3
14. Getting along with his/her parents 0 1 2 3
15. Getting along with his/her brothers or sisters 0 1 2 3
16. Being with a group of people that he/she knows 0 1 2 3
17. Going on a family vacation 0 1 2 3
18. Having relatives visit 0 1 2 3
19. Doing chores that he/she is asked to do, like washing the dishes, taking the garbage out or cleaning his/her room 0 1 2 3
20. Concentrating on his/her work 0 1 2 3
21. Going to a restaurant or fast food place 0 1 2 3
22. Having a boyfriend/girlfriend 0 1 2 3
23. Going to temple or church 0 1 2 3
24. Going to school outings or field trips 0 1 2 3
25. Keeping friends he/she already has 0 1 2 3
26. Eating lunch with other kids 0 1 2 3
27. Having someone spend the night at his/her house 0 1 2 3
28. Being prepared for class, e.g., having his/her books, paper or pencils ready when needed 0 1 2 3
29. Spending the night at a friend's house 0 1 2 3
30. Bathroom or grooming (brushing his/her teeth or combing his/her hair) in the morning 0 1 2 3
31. Completing assignments in class 0 1 2 3
32. Doing homework 0 1 2 3
33. Getting dressed in the morning 0 1 2 3

Appendix D

Questions About Behavioral Function (QABF)

Client's name and residence: \_\_\_\_\_  
 Name of person completing QABF: \_\_\_\_\_ Date: \_\_\_\_\_

Rate how often the CLIENT demonstrates the behaviors in situations they might occur.  
 Be sure to rate how often each behavior occurs, not what you think a good answer would be.

<input checked="" type="checkbox"/> Does not apply	<input type="checkbox"/> 0 Never	<input type="checkbox"/> 1 Rarely	<input type="checkbox"/> 2 Some	<input type="checkbox"/> 3 Often
--	----------------------------------	-----------------------------------	---------------------------------	----------------------------------

- \_\_\_\_\_ 1. Engages in the behavior to get attention.
- \_\_\_\_\_ 2. Engages in the behavior to escape work or learning situations.
- \_\_\_\_\_ 3. Engages in the behavior as a form of "self stimulation."
- \_\_\_\_\_ 4. Engages in the behavior because he/she is in pain.
- \_\_\_\_\_ 5. Engages in the behavior to get access to items such as preferred toys, food, or beverages.
- \_\_\_\_\_ 6. Engages in the behavior because he/she likes to be reprimanded.
- \_\_\_\_\_ 7. Engages in the behavior when asked to do something (get dressed, brush teeth, work, etc.).
- \_\_\_\_\_ 8. Engages in the behavior even if he/she thinks no one is in the room.
- \_\_\_\_\_ 9. Engages in the behavior more frequently when he/she is ill.
- \_\_\_\_\_ 10. Engages in the behavior when you take something away from him/her.
- \_\_\_\_\_ 11. Engages in the behavior to draw attention to him/herself.
- \_\_\_\_\_ 12. Engages in the behavior when he/she does not want to do something.
- \_\_\_\_\_ 13. Engages in the behavior because there is nothing else to do.
- \_\_\_\_\_ 14. Engages in the behavior when there is something bothering him/her physically.
- \_\_\_\_\_ 15. Engages in the behavior when you have something he/she wants.
- \_\_\_\_\_ 16. Engages in the behavior to try to get a reaction from you.
- \_\_\_\_\_ 17. Engages in the behavior to try to get people to leave him/her alone.
- \_\_\_\_\_ 18. Engages in the behavior in a highly repetitive manner, ignoring his/her surroundings.
- \_\_\_\_\_ 19. Engages in the behavior because he/she is physically uncomfortable.
- \_\_\_\_\_ 20. Engages in the behavior when a peer has something he/she wants.
- \_\_\_\_\_ 21. Does he/she seem to be saying, "come see me" / "look at me" when engaging in this behavior?
- \_\_\_\_\_ 22. Does he/she seem to be saying "leave me alone" or stop asking me to do this" when engaging in the behavior?
- \_\_\_\_\_ 23. Does he/she seem to enjoy the behavior, even if no one is around?
- \_\_\_\_\_ 24. Does the behavior seem to indicate to you that he/she is not feeling well?
- \_\_\_\_\_ 25. Does he/she seem to be saying, "give me that (toy item, food item)" when engaging in the behavior?

## Appendix E

## Quality of Life Impact Questionnaire

Name of Child: \_\_\_\_\_ Child DOB: \_\_\_\_\_  
 Name of Informant: \_\_\_\_\_ Relationship to Child: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Behaviour: \_\_\_\_\_

Please provide a rating for each question using the following rating scale:

1	2	3	4	5	6	7
Minimally						Extremely

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- \_\_\_\_\_ 1. Does the child's behaviour interfere with the child's opportunities for learning?
- \_\_\_\_\_ 2. Does the child's behaviour interfere with the child's opportunities for community integration or going out into the community?
- \_\_\_\_\_ 3. Does the child's behaviour interfere with the child's opportunities to develop friendships?
- \_\_\_\_\_ 4. Does the child's behaviour interfere with this child's opportunities to become involved in daily activities and routines?
- \_\_\_\_\_ 5. Does the child's behaviour interfere with opportunities of the family to invite friends into the home?
- \_\_\_\_\_ 6. Does the child's behaviour interfere with opportunities for family members to attend social functions and activities outside the home?
- \_\_\_\_\_ 7. Does the child's behaviour cause stress in others who live with the child?
- \_\_\_\_\_ 8. Does the child's behaviour result in others responding negatively to him/her?

TOTAL

## Appendix F

## Consumer Satisfaction Questionnaire

**CONSUMER SATISFACTION QUESTIONNAIRE**

*Think about previous services you have received for your child's*

*Obsessive and Compulsive Behaviours...*

Overall, how involved did you feel in the treatment?

1	2	3	4	5	6	7
						<i>very</i>
<i>not involved</i>			<i>involved</i>			

Overall, how satisfied were you in the services you received?

1	2	3	4	5	6	7
						<i>very</i>
<i>not all satisfied</i>			<i>satisfied</i>			

Overall, did you feel your child developed good strategies to cope with his/her obsessive-compulsive behaviours?

1	2	3	4	5	6	7
						<i>very much</i>
<i>not at all</i>						

Overall, how effective did you feel the services were?

1	2	3	4	5	6	7
						<i>very</i>
<i>not effective</i>			<i>effective</i>			



Appendix G

Baseline and Treatment Data for Hoarding

**Hoarding** occurs when Rachel collects and saves items that do not belong to her and/or that she did not which are used in a purposeful or productive way (I.e., useless items. Example, scraps of paper, flyers, papers from recycling bins, coupons, or pamphlets).

**Note:**

1. Each instance of hoarding will be counted. For example, every time Rachel collects and saves 'useless' items.
2. Opportunity refers to if there was a chance for the behaviour to occur such as when Rachel has access to a recycling bin or sees a wall of coupons at a store.

Data collection Target: 4x's per week in which there was an opportunity for the behaviour to occur.

Week of: \_\_\_\_\_

Date	Observer	Opportunity?	Hoarding occurred?	Items collected (E.g. coupons etc.)	Approx. # of items available	# of items saved
		Yes / No	Yes / No			
		Yes / No	Yes / No			
		Yes / No	Yes / No			
		Yes / No	Yes / No			
		Yes / No	Yes / No			

Notes:

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Baseline and Treatment Data for Packing

**Packing** occurs when Rachel places various items in a bag, backpack, suitcase, purse etc., and/or repeatedly checks and rechecks what she has placed in a bag, backpack or suitcase, and/or removes and replaces items packed (i.e., exchanges).

- Note:**
1. Each instance of packing will be counted. For example, every time Rachel puts her desired items into a bag, backpack or suitcase.
  2. Opportunity refers to if there was an chance for the behaviour to occur such as when Rachel is told that she will be going somewhere (e.g., to a store, grandmother's house etc.)
  3. Duration refers to how long the behaviour lasts - from start to finish. This is to be calculated by starting the timer after telling Rachel that she will be going somewhere and she begins packing and stopped when she has finished.

Data collection Target: 4x's per week in which there was an opportunity for the behaviour to occur.

Week of: \_\_\_\_\_

Date	Observer	Opportunity?	Packing occurred?	Location	Duration (min.)	Approx. # of items packed
		Yes / No	Yes / No			
		Yes / No	Yes / No			
		Yes / No	Yes / No			
		Yes / No	Yes / No			
		Yes / No	Yes / No			

Notes:

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Appendix H

ABC Data Collection Sheet - Packing

Date:	Antecedent (what happened before)	Behaviour (what Rachel did)	Consequence (what happened after)
Observer:	<p>Told Rachel we were going out to:</p> <ul style="list-style-type: none"> <li><input type="radio"/> A preferred location</li> <li><input type="radio"/> A non-preferred location</li> </ul> <hr/> <ul style="list-style-type: none"> <li><input type="radio"/> While she was engaged with a preferred activity</li> <li><input type="radio"/> While not engaged</li> </ul>	<p style="text-align: center;"><u>Packing</u></p> <p>Duration: _____</p> <p>Approx. # of items packed: _____</p>	<ul style="list-style-type: none"> <li><input type="radio"/> Left Rachel alone to pack</li> <li><input type="radio"/> Encouraged Rachel to:                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Hurry up</li> <li><input type="checkbox"/> To stop packing</li> </ul> </li> <li><input type="radio"/> Reminded we were leaving soon.</li> </ul>

Date:	Antecedent (what happened before)	Behaviour (what Rachel did)	Consequence (what happened after)
Observer:	<p>Told Rachel we were going out to:</p> <ul style="list-style-type: none"> <li><input type="radio"/> A preferred location</li> <li><input type="radio"/> A non-preferred location</li> </ul> <hr/> <ul style="list-style-type: none"> <li><input type="radio"/> While she was engaged with a preferred activity</li> <li><input type="radio"/> While not engaged</li> </ul>	<p style="text-align: center;"><u>Packing</u></p> <p>Duration: _____</p> <p>Approx. # of items packed: _____</p>	<ul style="list-style-type: none"> <li><input type="radio"/> Left Rachel alone to pack</li> <li><input type="radio"/> Encouraged Rachel to:                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Hurry up</li> <li><input type="checkbox"/> To stop packing</li> </ul> </li> <li><input type="radio"/> Reminded we were leaving soon.</li> </ul>

Appendix I

Functional Analysis Procedural Fidelity Checklist

**Target behaviour:** Hoarding

**Operational Definition of Hoarding:** Hoarding occurs when Rachel collects and saves items that do not belong to her and/or that she did not purchase which not used in a purposeful or productive way (i.e., useless items. Example, scraps of paper, flyers, papers from recycling bins, coupons, or pamphlets).

**Directions:** Document parent behaviours with regard to each of the steps listed below using the following key:

- ✓ Completed correctly    X Did not complete correctly    0 Did not do step

Observer: \_\_\_\_\_

Attention Condition	Observation 1 Date:	Observation 2 Date:	Observation 3 Date:	Observation 4 Date:
Removed attention from child.				
Told child that they were 'going to look at a book' & began flipping through a magazine / reading.				
Continued to ignore the child when she exhibited any behaviour other than collecting papers.				
Approached the child and provided a neutral comment only when the target behaviour occurred.				
Did not tell the child <i>not to do the behaviour</i> or that she was <i>not allowed to take things</i> from the room.				
Continued to give attention for 5 seconds when the target behaviour occurred and ignored again after 5 seconds had elapsed or the behaviour stopped.				

<b>Alone Condition</b>	Observation 1 Date:	Observation 2 Date:	Observation 3 Date:	Observation 4 Date:
Left child alone in a room treatment (equipped with a 2 way mirror).				
Environment was deprived of toys and activities (with exception of 1 bag).				
All behaviours whether appropriate or inappropriate were ignored.				

<b>Control Condition</b>	Observation 1 Date:	Observation 2 Date:	Observation 3 Date:	Observation 4 Date:
Gave access to numerous preferred items.				
Did not present demands.				
Periodically provided one-on-one attention (e.g., brief comment approx. every 30 seconds).				
Attention was continuously available and not contingent on target behaviour (hoarding).				
Problem behaviours were ignored.				

Appendix J

Treatment Integrity Checklist

**Target behaviours:** Hoarding & Packing

**Operational Definition of Hoarding:** Hoarding occurs when Rachel collects and saves items that do not belong to her and/or that she did not purchase which are not used in a purposeful or productive way (i.e., useless items. Example, scraps of paper, flyers, papers from recycling bins, coupons, or pamphlets).

**Operational Definition of Packing:** Packing occurs when Rachel places various items in a bag, backpack, suitcase etc., repeatedly checks and rechecks what she has placed in a bag, backpack or suitcase, and/or removes and replaces items packed (i.e., exchanges).

**Directions:** Document parent behaviours with regard to each of the steps listed below using the following key:

- ✓ Completed correctly      X Did not complete correctly      0 Did not do step

Observer: \_\_\_\_\_

Treatment Steps	Observation 1 Date:	Observation 2 Date:	Observation 3 Date:	Observation 4 Date:
Read social story "I will stop collecting" / "I will not pack a lot" as per schedule (1x day; 1x avg. 3 days; 1x week)				
Reviewed token system and rules as per schedule (1x day; 1x avg. 3 days; 1x week)				
Frequently provided attention for behaviors not involving hoarding &/or packing (approx. every 2 minutes).				
Attention was removed/ withheld when hoarding & / or packing behaviors occurred				
Provided tangible reinforcement (tokens) when hoarding behavior did not occur and/or when packing behaviours met criteria (i.e., limited # of items)				

Appendix K

Sample Social Story

**I will stop collecting!**

My name is \_\_\_\_\_.



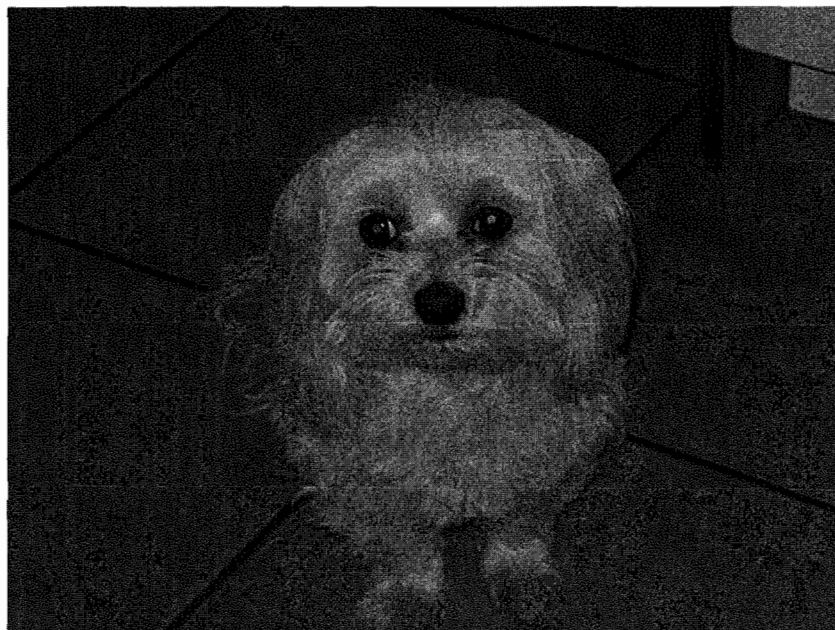


I like to do a lot of things.

I like to make crafts.

I like to play with my friend Hanna.

I like to play with my dog Taffy.

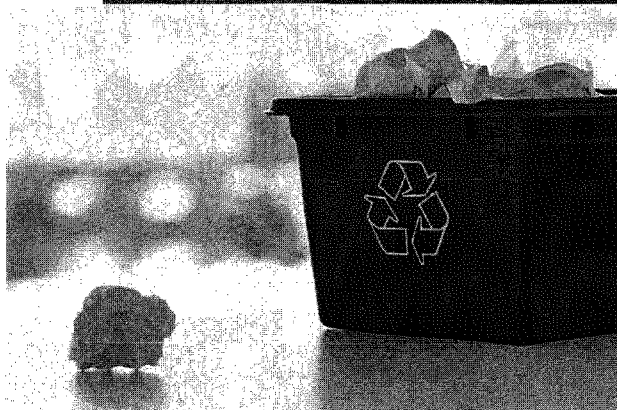


I also like to collect papers.

I like to collect all different kinds of papers

like coupons, flyers, scraps from

Recycling bins, and empty boxes.



Even though I like to collect these things,  
I shouldn't do it.

It's **silly** to collect and keep all these papers –  
they are **useless**.

My teachers don't like it when I take  
these things from school.

My mom and dad don't like when  
I bring all these things home.

They take up too much room in my house.

**I don't really need them.**

It is very important that I stop collecting these useless things.

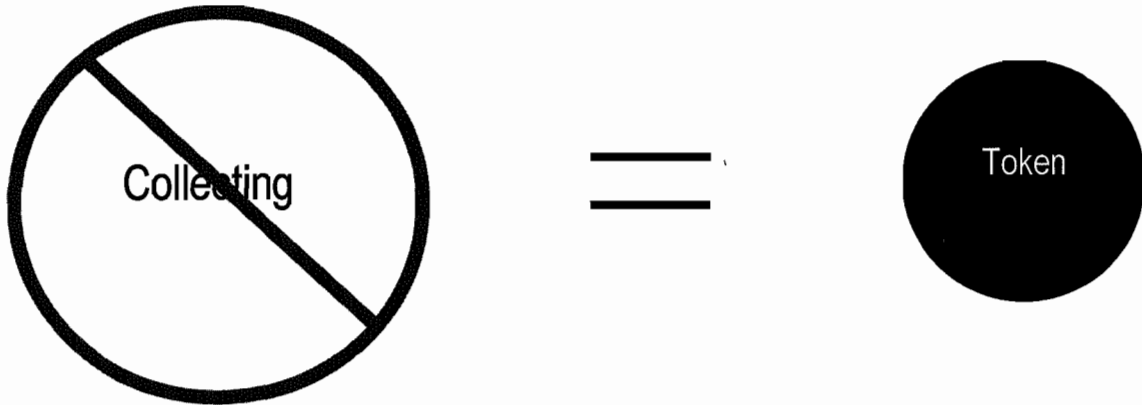
When I stop bringing home things like papers, flyers, and coupons, good things will happen.

I will be very happy.

My mom & dad will be very happy.



When I stop bringing home all these useless things  
I will get tokens.



I can use the tokens to buy other things I want.



I will stop collecting.

Appendix L

Sample Rules for Hoarding

**Rachel's rules**

- I will not collect things that don't belong to me
- I will not collect and save things like scraps of paper, coupons, or cardboard
- When I don't collect and save these things I will get tokens
- I can use my tokens to buy things I want