A Comparison of Functional Behaviour Assessment Rating Scales in a Sample of Children and Youth with Autism Spectrum Disorders

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ABSTRACT

This study sought to compare the results of the Motivation Assessment Scale (MAS; Durand & Crimmins, 1988), Questions About Behavior Function Scale (QABF; Matson & Vollmer, 1996) and Functional Analysis Screening Tool (FAST; Iwata & DeLeon, 1996), when completed by parent informants in a sample of children and youth with autism spectrum disorders (ASD) who display challenging behaviour. Results indicated that there was low agreement between the functional hypotheses derived from each of three measures. In addition, correlations between functionally analogous scales were substantially lower than expected, while correlations between non-analogous subscales were stronger than anticipated. As indicated by this study, clinicians choosing to use FBA questionnaires to assess behavioural function, may not obtain accurate functional hypotheses, potentially resulting in ineffective intervention plans. The current study underscores the caution that must be taken when asking parents to complete these questionnaires to determine the function(s) of challenging behaviour for children/youth with ASD.

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INTRODUCTION

According to a study conducted by Lecavalier (2006), almost 50% of young people with autism spectrum disorders (ASDs) exhibit challenging behaviour such as aggression, self-injury or disruptive behaviour. These behaviours can have detrimental effects on the lives of these individuals as well as those around them, resulting in health and safety risks (Nissen & Havemen, 1997), increased caregiver stress (Lecavalier, Leone & Wiltz, 2006; Tomanik, Harris & Hawkins, 2004), the use of intrusive procedures (Emerson, et al., 2000), and placement in restrictive environments (Sigafoos, Arthur, & O'Reilly, 2003). Behavioural interventions based on applied behaviour analysis (ABA) have been found to be highly effective in reducing challenging behaviours displayed by individuals with ASD (Campbell, 2003; National Autism Centre, 2009). In order to design interventions that can effectively reduce challenging behaviour and teach adaptive skills, clinicians and researchers require detailed information on the environmental variables that reliably predict the occurrence of the behaviour, as well as the consequences that maintain the behaviour in order to determine why a particular behaviour occurs (Horner, 1994).

Functional behaviour assessment (FBA) is an assortment of procedures used to gather information about the behaviour of concern and the setting events, antecedents and consequences that surround the behaviour in order to ultimately determine the function of the behaviour (Horner, 1994). There is a significant body of research to support the use of interventions that have been designed based on the results of FBA for individuals with autism and intellectual disabilites (ID) (e.g., Hanley, Iwata & McCord, 2003; National Institute of Health, 1991; Newcomer & Lewis, 2004).

While conducting a FBA is considered best practice for treating problem behaviour, there is considerable debate in the literature regarding the most effective method for doing so. Experimental functional analysis (EFA; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) involves exposing the client to environmental conditions that have historically evoked the problem behaviour and providing specific

consequences in response to the behaviour for the purpose of identifying causal relationships (Iwata, et al., 1982/1994). Although these methods are considered to be quite robust, there are a number of challenges associated with the use of EFA, including the vast amount of time and resources required (Paclawskyj, Matson, Rush, Smalls & Vollmer, 2000), and the ethical implications of provoking behaviour and potentially reinforcing it (Neef & Peterson, 2007). Descriptive methodologies such as antecedent-behaviour-consequence recording scatter plots and direct observations have provided an effective alternative to the use of experimental methodologies (Feldman & Griffith, 1997). Descriptive methods have been shown to be time consuming (Neef & Peterson, 2007) and though they can identify correlations between events and behaviours, unlike EFA these methods cannot demonstrate causal relationships (Sprague & Horner, 1995). As a result, clinicians and researchers continue to seek out more efficient and practical alternative methods of FBA to be used in the field.

Informant measures such as interviews and questionnaires rely on subjective information obtained from caregivers and staff. These methods provide an easy and time efficient method for conducting FBA. Over the past several decades a body of research examining the utility of FBA questionnaires, such as the MAS (Durand & Crimmins, 1988) and the QABF (Matson & Vollmer, 1995) has indicated that while these instruments show promise, more information is needed on the psychometric properties of these tools before they can be used with confidence to assess challenging behaviour and develop effective treatment plans. The FAST (Iwata & DeLeon, 1996) is arguably the most widely used FBA questionnaire for determining function yet it remains unpublished by the authors and has very little research to support its use (Ellingson, Miltenberger & Long, 1999). To date researchers have examined the concordance of results from the MAS and QABF with the results of EFA completed for individuals with intellectual disabilities (ID) (e.g., Paclawskyj et al., 2001). No published study has compared the results of the MAS and QABF to the FAST. Further, there are no published studies examining the convergence of these instruments using a sample of individuals with ASD. The overwhelming majority of

studies examining the utility of FBA questionnaires have employed direct care staff, teachers or professionals as informants. With the existence of a number of community agencies providing behaviour support to individuals with ASD living in the community, parents are frequently being asked to complete these measures. This emphasizes the need for research with this population.

Despite the limited evidence supporting the use of these questionnaires for people with ID and/or ASD, there appears to be increased reliance on survey measures in clinical settings (Ellingson et al.,1999), and new measures continue to be developed (e.g., Questions About Behavior Function – Short Form, Singh et al., 2009; GB Motivating Screening Tool, Barrera & Graver, 2009). The purpose of this study is to compare the results of the MAS, FAST and QABF when completed by parent informants, in a sample of children and youth with ASD who display challenging behaviour.

The following section will review the prominent features of ASD, and general concepts of ABA and FBA. Further, the wide array of methodologies available to clinicians conducting FBA will be described, along with the strengths and limitations of each in order to provide the reader with an understanding of the context in which FBA rating scales were developed and are currently used.

REVIEW OF LITERATURE

Autism Spectrum Disorders

Autism Spectrum Disorders (ASDs) are a group of developmental disabilities characterized by a triad of impairments that involve deficits in social interaction and communication, along with disruptions in behavioural functioning (Wing & Gould, 1979; APA, 2000). Recent studies have indicated that ASD affects 1 in every 110 children (Rice, 2009). Specific disorders under this umbrella include Autistic Disorder, Childhood Disintegrative Disorder, Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), Rett's Disorder and Asperger's Disorder (American Psychiatric Association, 2000).

The central feature of ASDs is a significant qualitative impairment in reciprocal social interaction (Perry & Black, 1999). In accordance with the Diagnostic and Statistical Manual IV-TR (DSM IV-TR) (APA, 2000), behaviours associated with this deficit include: lack of social/emotional reciprocity, failure to develop peer relationships appropriate to one's developmental level, and significant deficits in the use of nonverbal behaviours (e.g., eye contact, body language, facial expression, etc.) especially those that regulate social interaction (APA, 2000). Often, people interpret this set of symptoms to mean that individuals with ASD are asocial and are not interested in engaging with others, however, this is not necessarily the case. These symptoms simply signify a lack of understanding about social relationships and a lack of core communicative and social skills (Perry & Black, 1999).

Secondly, individuals with ASD experience a qualitative impairment in the area of communication which may include, but are not limited to significant difficulties in initiating and maintaining conversation, delayed speech or a complete lack of speech, repetitive speech or idiosyncratic language use (APA, 2000). Those who do develop verbal language may be capable of expressing themselves in complete sentences, or may be limited to single word utterances (Gillberg, 2007). In addition, individuals who are verbal often engage in echolalia, a disordered pattern of speech which is defined as the immediate or delayed repetition of a single word or phrase (Prizant, 1983). In an attempt to compensate for these deficits in verbal communication some individuals are taught to use augmentative forms of communication to express their needs such as sign language (Bonvillian, Nelson, & Milnes Rhyne, 1981), Picture Exchange Communication System (Frost & Bondy, 1994), gestures, or voice output communication aids. In addition to the deficits and disorders in expressive language, the majority of individuals who have ASD also experience difficulties in understanding spoken language (Gillberg, 2007).

The final category included within the triad of impairments is restrictive and repetitive patterns of behaviour (APA, 2000). Individuals who have ASD can often be seen engaging in stereotypical motor movements such as rocking back and forth, hand

flapping or jumping up and down. The desire for adherence to routines is also quite common and is often manifested in ritualistic behaviour (e.g., insistence upon driving the same route to a particular location, or having the same food for breakfast each day). In addition, individuals with ASD may have a limited repertoire of interests, and in many cases may become fixated on particular items or topics (APA, 2000). Finally, individuals who have ASD often become preoccupied with particular features of the object rather than focusing on the object as a whole; thereby impacting on functional use. This phenomenon was first noted by Lovaas and Schreibman (1971) who referred to this pattern of behaviour as stimulus overselectivity. To those who are not familiar with the nature of ASD, the behaviours described above can appear odd and make the individual stand out from his or her peers.

According to the DSM-IV-TR, the vast majority of individuals diagnosed with Autistic Disorder specifically also have some degree of cognitive impairment ranging from mild to profound (APA, 2000). In fact, Autistic Disorder has become one of largest diagnostic categories within the population of ID (Bradley et al, as cited in Nordin & Gillberg, 1996; Stromme & Diseth, 2000). The severity of autism, in combination with the degree of cognitive impairment determines an individual's level of functioning (Perry & Black, 1999).

ASD and Challenging Behaviour

While the presence of challenging behaviour is not included within the DSM IV-TR diagnostic criteria (APA, 2000), the very nature of the impairments experienced by individuals with ASD places these individuals at serious risk for developing problem behaviour. According to a recent study conducted by Lecavalier (2006), the prevalence of problem behaviour amongst young people with autism spectrum disorders is just under 50%. In a meta-analysis conducted in 2003, McClintock, Hall and Oliver confirmed that a diagnosis of Autistic Disorder amongst individuals with ID is a significant risk factor for exhibiting challenging behaviour. Similarly, Bradley, Summers, Wood and Bryson (2004) reported that individuals with a diagnosis of Autistic Disorder along with severe ID were

more likely to experience a behavioural disorder when compared to controls without a diagnosis of autism matched for gender, IQ, and chronological age. Individuals with ASD have been known to demonstrate a wide variety of challenging behaviour including aggression, self-injurious behaviour (SIB), stereotypical behaviour, destructive behaviour, disruptive behaviour, etc. There are vast differences in topography (i.e., the physical shape and form of the motor components involved) of these behaviours as well as variations across the dimensions of behaviour including frequency, intensity and duration, making each individual's behaviour unique.

Challenging behaviours can have detrimental effects on lives of individuals with ASD and their families and may compromise physical and mental health, result in restrictive environments, and impact quality of life. First and foremost, these behaviours can threaten the safety of the individual and those around him/her, and in some cases, may even be life-threatening (Nissen & Havemen, 1997). Several cases of self-injury resulting in serious bodily harm and even permanent physical damage have been reported (e.g., Dorsey, Iwata, Reid, & Davis, 1982). A study examining the risk of injury in a sample of children and adolescents with ID found that the presence of clinically significant behavioural challenges placed individuals at an increased risk of injury (Sherrard, Tonge & Ozanne-Smith, 2002).

In addition, several researchers have reported on the association between problem behaviour and caregiver stress. More specifically, mothers of children with ASD who display challenging behaviours have reported elevated levels of stress (Lecavalier, Leone & Wiltz, 2006; Tomanik, Harris & Hawkins, 2004). Furthermore, these stress levels were found to be stable over a one-year period (Lecavalier et al., 2006). This positive correlation between reported stress levels and caring for children who present with challenging behaviour was also found in a sample of teachers (Lecavalier et al., 2006).

Individuals with ID including those with ASD who display challenging behaviour are at risk of being subjected to behaviour reduction programs that involve intrusive procedures (Feldman, Atkinson, Foti-Gervais, & Condillac, 2004). Several studies have

investigated the various interventions used in residential settings to manage severe challenging behaviour displayed by individuals with ID (e.g. Emerson et al., 2000). Commonly used strategies included physical or mechanical restraint, contingent exercise, aversive conditioning, overcorrection, seclusion or confinement time out, or pharmacological management (Emerson et al., 2000; Feldman et al., 2004). In a recent study conducted by Tsakanikos, Costello, Holt, Sturmey and Bouras (2007), the presence of challenging behaviour served as a strong predictor of psychotropic medication use as a behaviour management strategy in a sample of individuals diagnosed with an ASD and ID. While the use of pharmacological treatments to reduce behavioural challenges in this population appears to be on the rise (Coghill, 2003), Matson and Dempsey (2008) have outlined a variety of concerns regarding this trend. First, many of the published studies that have claimed the effectiveness of pharmacological interventions have been riddled with methodological issues, and thus, the true effectiveness of some medications is unclear. Second, these medications can have very serious side effects, and in many cases, the long-term effects of such medications are unknown. Third, Matson & Dempsey (2008) noted that once the medication is discontinued, the problem behaviour is likely to re-emerge.

In addition, individuals who present with serious challenging behaviour are often placed in restrictive environments that are better equipped to manage or treat behaviour. In a survey investigating psychiatric hospitalization among children and youth with autism spectrum disorders, Mandell (2008) found that engaging in aggressive or self-injurious behaviours increased the probability that an individual would be hospitalized. Furthermore, as noted by Emerson (2000), the presence of challenging behaviour places individuals who have ID at risk of long-term residential placement. Finally, these behaviours also limit the ability of individuals with ID to be involved in their communities (Sigafoos, et al., 2003).

Applied Behaviour Analysis (ABA)

Due to the debilitating effects of the challenging behaviours displayed by individuals with autism spectrum disorders, a great deal of research has been dedicated to understanding the causes of this behaviour in order to develop effective intervention plans (e.g., Campbell, 2003). Much of this research has been conducted by professionals in the field of applied behaviour analysis (ABA). Furthermore, recent reports from the National Standards Project indicate that the vast majority of established treatments for individuals with ASD, include those designed to address problem behaviour were grounded in the ABA literature (National Autism Centre, 2009).

ABA is the science dedicated to the "understanding and improvement of human behaviour" (Cooper, Heron & Heward, 2007, p. 3). In 1968, Baer, Wolf and Risley described seven dimensions of ABA – applied, behavioural, analytic, technological, conceptually systematic, effective and generality. Interventions based on ABA by definition, must be applied, behavioural and analytic (Baer et al., 1968). First, ABA targets only those behaviours that are *applied* – that is, these behaviours must be relevant to the client and the important people in his or her life (e.g., life skills, communication, social skills, etc.). Second, the *behaviour* targeted for intervention must be objective and measurable to allow behaviour analysts to evaluate the impact of the intervention. This leads to the third dimension – *analysis*. It is imperative that the relationship between environmental events and the target behaviour be examined and, whenever possible, a causal relationship be demonstrated. The fourth element of ABA is that it must be *technological*. This means that all of the procedures used in practice must be described in a clear and detailed manner in order to allow outsiders to replicate these procedures as necessary, for both clinical and research purposes. Furthermore, as described within the fifth element which states that ABA must be *conceptually systematic*, the patterns of behaviour derived from such analyses must be explained by the underlying principles of behaviour. The sixth dimension, *effectiveness*, asserts that ABA should produce clinically relevant changes in behaviour. The final characteristic,

generality, refers to the notion that the behaviour changes produced should be maintained over time and should generalize across a wide variety of contexts following the termination of the intervention plan. Baer and colleagues (1968) first described these characteristics four decades ago and found them still relevant 20 years later (Baer, Wolf & Risley, 1987). Behaviour analysts will agree that these characteristics continue to be relevant to the field of ABA (Carr & Sidener, 2002; Johnston et al., 2006).

ABA is grounded in the philosophy of behaviourism, which is based on the premise that behaviour is learned through interaction with environmental events (Skinner, 1974). As described in several basic ABA texts (e.g., Cooper, et al., 2007; Miltenberger, 2004) behaviour occurs under specific stimulus conditions (known as antecedents), and is followed by a consequence, which then determines the likelihood of the reoccurrence of that behaviour. If a desirable consequence known as reinforcement occurs immediately following the behaviour, the likelihood that the behaviour will occur in the future is increased. Whereas an undesirable consequence which follows the behaviour (referred to as punishment) decreases the likelihood that the behaviour will reoccur.

All behaviour – including both desirable and undesirable behaviour– serves a function or a purpose (Carr, 1977). That is, behaviour is a means of gaining access to a desired consequence or escaping/avoiding an undesirable situation. The most commonly investigated functions of behaviour include: (a) social attention, (b) tangible items/activities, (c) escape and sensory stimulation.

Introduction to Functional Behaviour Assessment

Functional behaviour assessment (FBA) is an assortment of procedures used to gather information about the behaviour of concern along with the setting events, antecedents and consequences in order to ultimately determine the function of the behaviour (Horner, 1994). The information obtained through FBA is essential for intervention planning. A comprehensive understanding of *why* a particular behaviour continues to occur provides behaviour analysts with information necessary to change the behaviour (Horner, 1994). If effective, a well-conducted FBA will yield information

regarding the specific contingencies maintaining the problem behaviour, the antecedent conditions that need to be altered in order to prevent the occurrence of problem behaviour, and will also identify a functionally equivalent behaviour to be taught to the individual that will enable him/her to access reinforcement without resorting to the problem behaviour (Carr & Durand, 1985).

In addition to identifying the environmental events that are associated with the problem behaviour, Gardner (1998) argued that a FBA should also assess and identify any relevant biomedical, and psychological conditions that contribute to behaviour. In his description of this approach, Gardner explains that in using a bio-psycho-social model, clinicians must examine the full range psychiatric (e.g., affective disorders, psychosis) and medical conditions (e.g., tooth aches, ear infections), psychological deficits (e.g., impairments in communication or self-regulation) as well as the psychosocial conditions when attempting to explain why a particular behaviour occurs. Gardner stresses that this model necessitates the engagement of a multidisciplinary team to complete relevant assessments and contribute to the related parts of the treatment plan. The bio-psycho-social model attempts to ensure that each of the factors that are found to contribute to the problem behaviour are addressed in order to effectively reduce the behaviour of concern.

There is a significant body of research to support the use of interventions that have been designed based on the results of FBA for individuals with ID including ASD (e.g., Didden, Duker & Korzilius, 1997; Hanley, et al., 2003; National Institute of Health, 1991; Newcomer & Lewis, 2004; Scotti, Evans, Meyer & Walker, 1991). In 2003, Campbell reported on a meta-analysis that was conducted to examine the efficacy of behavioural interventions to reduce challenging behaviour displayed by individuals with ASD. After reviewing data from 181 participants from over 100 published studies, Campbell (2003) concluded that interventions that had been developed based on the results of a FBA were more effective in reducing the problem behaviour of individuals with ASD when compared to interventions that were not based on FBA.

In 2004, Newcomer and Lewis directly compared the effectiveness of interventions based on the results of FBA and non-function-based interventions, which have historically relied on the topography of the behaviour to guide treatment plans. After identifying the functions of the behaviours displayed by three children with behavioural/emotional disorders via FBA, researchers, in conjunction with classroom teachers, developed two interventions for each participant. The first intervention was developed based on the results of the FBA and included teaching an alternative functionally equivalent behaviour (e.g., teaching the participant to ask to be excused from group work with peers, to replace escape-maintained problem behaviour). In contrast, the second intervention was developed based on the topography of the behaviour, without regard for the variables that were found to be functionally related to the behaviour (e.g., reinforcing pro-social interaction with peers to reduce behaviour maintained by escape) (Newcomer & Lewis, 2004). Using a multiple baseline across participants design, the non-function based and function based interventions were implemented, and their effects on the challenging behaviours compared. Interventions that were developed based on the results of FBA were more effective at reducing the problem behaviour in all three cases (Newcomer & Lewis, 2004). Furthermore, in two out of the three cases, the non-function based intervention led to an increase in the problem behaviour indicating that interventions that are not based on FBA are not only less effective, but can have detrimental effects (Newcomer & Lewis, 2004).

FBA Methodologies

While FBA is considered best practise for treating challenging behaviour, there is considerable debate in the literature regarding the most effective method for doing so. FBA methodologies generally fall into one of two categories – experimental and descriptive methods. Experimental methodologies were the first to be developed (Iwata, et al., 1982/1994). While these methods showed great promise in detecting causal relationships between environmental events and behaviour, concerns regarding the use of experimental methodologies emerged. Behaviour analysts sought out less intrusive

and more practical means of assessing the functions of behaviour (Feldman & Griffiths, 1997). As a result, descriptive methods, which use information gathered from the individual's natural environment, can be broken down further into two categories: (a) direct methods, and (b) indirect methods (Neef & Peterson, 2007). While this study focuses on the use of FBA questionnaires, an indirect method of assessment, it is essential that the reader has an appreciation of the evolution of FBA, in order to understand how and why informant measures were developed and the types of methodologies they purport to replace. The following section will describe the various methodologies in each of these categories, review the literature regarding their psychometric properties and outline their strengths and limitations.

Experimental Methodologies

Experimental Functional Analysis (EFA)

Experimental functional analysis, also referred to as analog functional analysis (Iwata, et al., 1982/1994), involves exposing the client to environmental conditions that have historically evoked the problem behaviour and providing specific consequences in response to the behaviour for the purpose of identifying causal relationships. The test conditions (e.g., contingent escape, contingent attention, and alone) and the control condition (e.g., play) are rotated rapidly in a random order while all other variables within the environment are held constant. Objective data are collected and plotted on a graph in order to identify the function of the behaviour. For instance, if the rate of behaviour was elevated in the contingent attention conditions, then one could conclude that the behaviour is maintained by social reinforcement. Alternatively, the same pattern of behaviour occurring in the contingent escape condition suggests that the function of the behaviour is negative reinforcement. A high rate of behaviour occurring during the alone condition reveals that the target behaviour is maintained by automatic reinforcement and is not socially mediated. Finally, if the pattern of behaviour is undifferentiated, that is, there are no clear patterns with respect to the rate of behaviour, the results are inconclusive (Iwata, et al., 1982/1994).

EFA was first introduced to the field of ABA in 1982, when a seminal article published by Iwata, Dorsey, Slifer, Bauman and Richman used the methodology to assess the functional relations of self-injurious behaviour. Nine children and adolescents with ID who exhibited various topographies of self-injury were exposed to the four analog conditions described above (Iwata et al., 1982/1994). Data obtained during the EFA revealed several notable findings. First, differential responding across participants was observed, indicating that SIB was maintained by different sources of reinforcement (Iwata et al., 1982/1994). Second, differential responding was also observed within participants. In fact, two thirds of the participants displayed high levels of behaviour associated with one of the conditions, leading researchers to conclude that the high rates of behaviour were the result of specific environmental conditions (Iwata et al., 1982/1994). Iwata et al. (1982/1994) reported that interventions based on the results of the EFA were developed and implemented for each participant. Unfortunately, treatment data were not presented, although the authors did note that the results were promising (Iwata et al., 1982/1994).

When it comes to functional behaviour assessment, EFA is considered to be the gold standard against which other methodologies are compared (Hanley et al, 2003). In fact, research in applied behaviour analysis relies heavily on this methodology to accurately determine the function of challenging behaviour. The major attraction of EFA is that it allows the researcher or clinician stringent control over the environment which facilitates the identification causal relationships between environmental events and the problem behaviour (Neef & Peterson, 2007). Since the original publication of this research, countless studies have utilized EFA to identify the functions of a variety of challenging behaviours in individuals with autism and other ID including aggression (e.g., Thompson & Iwata, 2007), vocal stereotypy, (e.g., Ahearn, Clark, MacDonald, & Chung, 2007), pica, (e.g., Piazza, Roane, Keeney, Boney, & Abt, 2002) destructive behaviour (e.g., Fisher, Adelinis, Thompson, Worsdell, & Zarcone, 1998) among others. Additionally, many researchers have developed and implemented intervention plans based on the results of EFA in order demonstrate the validity of the methodology (e.g.,

Ahearn et al., 2007). A reduction in problem behaviour attributed to the implementation of the intervention provides confirmation of the validity of the EFA (Iwata et al., 1982/1994). Overall, the results of such studies have provided a substantial amount of support of the validity of EFA (Hanley et al., 2003)

Despite the praise that EFA has received for its rigor, there are numerous limitations inherent in the methodology. In 1995, Sturmey provided a thorough critique of EFA in which he summarized these limitations. While this methodology lends itself nicely to behaviours that occur at high frequency, low rate behaviours may not yield a sufficient amount of data necessary to determine the function. Also, the rapidly changing conditions characteristic of the multi-element design used to conduct EFA can be problematic for several reasons. Not only must the participant/client be able to discriminate between the rapidly alternating conditions, but the behaviour must be sensitive to these changes.

In addition, the conditions that are typically used during an EFA are quite broad and may not identify the specific contingencies maintaining a behaviour (Horner, 1994). Horner (1994) suggested that it is simply not enough to conclude that a problem behaviour is maintained by escape from a particular task, but one must have a means of isolating the specific properties of that task that make it aversive. In order to make such slight discriminations, EFAs must be designed with more specificity and individualization (Horner, 1994).

Furthermore, the ecological validity of EFA has been questioned, as the target behaviour is not subject to natural contingencies (Hall, 2005; Sturmey, 1995). More specifically, EFAs are frequently conducted in sterile environments in which the client is exposed to contrived conditions that merely resemble those from the natural environment. Therefore, the causal relationships identified may not be generalizable to the natural environment.

As noted in the initial evaluation of EFA conducted by Iwata et al. (1982/1994), this methodology is not able to detect the function of challenging behaviours in one hundred percent of cases. Since then, there have been a number of documented cases

where, EFAs have been unsuccessful in identifying the function of problem behaviour (e.g., Hagopian, Bruzek, Bowman & Jennett, 2007; Roane, 2008). In such instances, alternative forms of functional behaviour assessment might be needed to provide additional information (Hagopian et al., 2007).

In addition to these methodological concerns, there are a number of practical limitations to the use of EFA in applied settings. EFA is considered to be quite laborious (Paclawskyj, Matson, Rush, Smalls & Vollmer, 2000), and may require one to two weeks to complete (Iwata et al., 1994). As a result, EFA can place a significant strain on human and financial resources. Furthermore, the planning an implementation of EFA, requires specific expertise (Sturmey, 1995).

Moreover, the use of EFA presents serious ethical dilemmas for researchers and clinicians when it is used to assess dangerous problem behaviour (e.g., self-injury and aggression). As discussed above, this methodology involves prompting the occurrence of the target behaviour, which in many cases poses considerable risk, thereby increasing the likelihood of injury of the client (and staff) during the assessment. Furthermore, since the behaviour once elicited is then reinforced, the future occurrence of the behaviour will increase (Neef & Peterson, 2007), also elevating the risk of injury. In 1997, Feldman & Griffiths proposed that the *least intrusive* model of intervention be extended to FBA, stating that the most efficient and least intrusive methods of obtaining information should be utilized when assessing problem behaviours. For this reason, along with the practical limitations discussed above, many researchers and clinicians advise against the everyday use of EFA, suggesting that this methodology be reserved for situations in which other FBA methodologies have been unsuccessful in identifying the variables maintaining the problem behaviour (Feldman & Griffiths, 1997; Sturmey, 1995)

A final disadvantage of EFA is the limited information available regarding the reliability of the methodology. In 1999, Martin, Gaffan and Williams examined the test-re-test reliability of EFA with a sample of 27 adults with ID and challenging behaviour. The EFA was repeated eight times over the course of the 64 week assessment period.

Overall test-retest reliability was poor, and authors cited the possibility of a change of function over the course of the 64 week assessment period, or inadvertent changes in environmental variables (e.g., staff turn-over) as possible explanations.

Brief Functional Analysis

An abbreviated version of EFA has since been developed to allow for the methodology to be used to assess problem behaviours observed in an outpatient community clinic (Northup, et al., 1991). The modified EFA, referred to as brief functional analysis, uses a methodology comparable to EFA. Each of the conditions is run for a single session initially, and in some cases, the conditions in which the rate of behaviour is the highest and the lowest are then replicated for confirmation (Northup et al., 1991).

In an initial examination of the brief functional analysis procedure with individuals with ID, Northrup et al. (1991) used the methodology to assess aggressive and self-injurious behaviour of three individuals. In all three cases, the function of the behaviour was identified and a function-based intervention was implemented. A subsequent reduction in the target behaviour validated the approach, leading researchers to further explore the methodology. In 1992, Derby and colleagues attempted to replicate the above findings in 79 cases in which brief functional analysis was used in an outpatient community clinic serving individuals with ID. However, only 63% of participants exhibited the problem behaviour during the 90 minute assessment period. Of the participants who did exhibit the target behaviour during the course of the assessment, a function was identified in only 74% of cases. While this study demonstrated that the potential utility of brief functional analysis in a community based outpatient setting it also highlighted some of the challenges associated with the method.

While many of the strengths and limitations discussed above with respect to EFA also apply to brief functional analysis, one obvious advantage of the abbreviated version is that can be completed in less than 90 minutes (Northup et al., 1991). This allows for it to be utilized in outpatient settings where face-to-face time with clients may be limited or irregular. Yet, shortened assessment time is not always advantageous. As noted by

Derby et al. (1992), behaviours that occur at a low frequency may not be observed during the course of the assessment. In addition, since there is only a single point of data collected for each of the conditions, procedural errors which are likely absorbed by numerous data points when conducting an EFA may significantly impact the data in brief functional analysis that rely on one data point per condition. Therefore the need for precise implementation of procedures is exemplified when using brief functional analysis (Derby, 1992). Furthermore, in a study comparing the results of traditional EFA and brief FA described above, Kahng & Iwata (1999) reported that results were concordant in only 66% of cases.

Structural Analysis

In 1985, Carr & Durand utilized a variation of the experimental methods described above to identify the antecedent conditions associated with challenging behaviour. The method described by Carr and Durand (1985), referred to as structural analysis, differs from the methods described above in that only the antecedent conditions are manipulated while the consequences of the problem behaviour are held constant. For instance, when assessing problem behaviour displayed by four children with ID, Carr and Durand designed and implemented several different antecedent conditions while monitoring rates of behaviour as follows: (a) easy task with high levels of adult attention, (b) easy task with low levels of adult attention, and (c) difficult task with high levels of adult attention. Results indicated that high rates of problem behaviour occurred during conditions where children received low levels of adult attention or were asked to complete a difficult task. Conditions in which relatively high rates of problem behaviour are observed suggest a functional relationship between the environmental variable(s) present and the problem behaviour (Carr & Durand). The function of the behaviour can then be inferred by reviewing the patterns of behaviour in each of the antecedent conditions.

Again, many of the strengths and limitations of this approach are consistent with those described above in the discussion regarding EFA. Since this method does not involve reinforcing the behaviour, ethical concerns regarding providing explicit reinforcement upon the occurrence the problem behaviour are not applicable to structural analyses. But as Hanley et al. (2003) indicated, limiting manipulation to antecedent events presents additional challenges. Most importantly, structural analyses are simply not as rigorous as the methodology described by Iwata et al. (1982/1994). That is, while a functional relationship between antecedent condition and problem behaviour can be identified, the function must be inferred from the data, which has the potential to result in incorrect assumptions.

Descriptive Methodologies

Unlike experimental methods, descriptive methods use information obtained from observation of an individual in their natural environment, under naturally occurring conditions (Neef & Peterson, 2007). In contrast to EFA, where causal relations can be detected, descriptive methods yield relationships that are correlational in nature (Yarbrough & Carr, 2000). Descriptive assessments can be categorized as being direct or indirect. Direct methods of assessment are characterized by the direct observation and objective measurement of the target behaviour; whereas indirect methods rely on subjective accounts obtained from others who have observed the behaviour (Neef & Peterson, 2007).

Direct Methods

Antecedent-Behaviour-Consequence (ABC) charts. ABC charts, first described by Bijou, Peterson and Ault (1968), are amongst the most popular forms of direct methods of FBA. Collecting ABC data involves recording the context in which the target behaviour occurs including the events that immediately precede and follow it each time the behaviour is exhibited. Data are compiled and analyzed to isolate the events that are highly correlated with the occurrence of the target behaviour. There are two main subtypes of ABC recording. The first, continuous ABC data entails recording the pre-

selected antecedents, the occurrence and non-occurrence of the problem behaviour, and the consequences (Neef & Peterson, 2007). This method allows clinicians to calculate conditional probabilities describing the likelihood of the behaviour occurring under a given circumstance. Alternatively, narrative ABC data recording simply requires the individual to record events in which the target behaviour occur (Neef & Peterson, 2007).

ABC data recording is beneficial in that it allows for objective data to be collected in the natural environment, revealing the natural contingencies maintaining the behaviour. Also, continuous ABC data recording can provide the probability of the occurrence of the behaviour and for this reason, this variation is regularly used in research (Neef & Peterson, 2007). While some may argue that extensive training is not required to collect ABC data, as Lennox and Miltenberger (1989) suggested, insufficient training can lead to mediocre data collection. Those without sufficient training may omit important details and/or include statements inferring the occurrence of covert events (e.g., "He *thought* that his toy was being taken so he *felt* sad."). Moreover, interpretation of the raw data in order to identify patterns of behaviour requires a trained behaviour analyst. Depending on the variation of ABC being used, data recording can be time consuming (Neef & Peterson, 2007). Continuous ABC data collection can be considerably more demanding compared to narrative ABC data collection (Neef & Peterson, 2007). Finally, as noted above, descriptive methods of FBA such as ABC data can identify correlations between events and behaviours, but not causal relationships (Sprague & Horner, 1995).

Scatter plots. Another well-known tool for conducting direct assessment of challenging behaviour is the scatter plot (Touchette, MacDonald & Langer, 1985). Touchette et al. (1985) describe the scatter plot as being a grid with successive days along the X axis and specified time intervals placed along the Y axis. The occurrence of the target behaviour is marked in the box corresponding to the appropriate time interval (Touchette et al., 1985). Upon completion of the assessment period, visual inspection of the grid allows the behaviour analyst to identify the stimuli that control the occurrence and non-occurrence of the behaviour (e.g., temporal relations, recurring activities).

While scatter plots are commonly used in clinical practice, few studies have evaluated the utility of the tool. In the original study conducted by Touchette et al in 1985, three case studies were presented illustrating the scatter plot and its usefulness in identifying various sources of stimulus control in the natural environment. In each case, the information obtained from the scatter plots was used to develop an intervention plan that consisted of the elimination of the variables controlling the behaviour and stimulus fading (Touchette et al., 1985). Following the implementation of the intervention plan, the problem behaviours displayed by all three participants were reduced significantly to what was considered acceptable levels (Touchette et al., 1985). Furthermore, 12-month follow up data were presented for two participants and indicated that low levels of problem behaviour had been maintained (Touchette et al., 1985).

In 1998, Kahng and colleagues attempted to replicate these findings with a sample of 20 individuals with ID living in residential facilities. The length of the assessment period was extended from 1 week as in the Touchette et al. (1985) study to 30 days. Due to concerns with inter-observer reliability, 5 of the 20 data sets were discarded, leaving data from 15 participants for analysis. Visual inspection of each of the scatter plots was completed by eight behaviour analysts; however, these data did not reveal any reliable temporal relations in any of the 15 participants (Kahng et al., 1998). When statistical analysis was performed using aggregate control charts, 12 of the 15 participants' data revealed patterns in temporal responding. Kahng et al. (1998), suggested a number of explanations for the discrepancy of their findings as well as the findings reported by Touchette et al. (1985).

As noted by Touchette et al. (1985), in many cases problem behaviour is controlled by a wide variety of stimuli that are present throughout an individual's day. Systematic evaluation of such a wide array of stimuli in applied settings is often not feasible; making scatter plots a practical alternative in such instances. They also argued that the use of scatter plots requires minimal training and interpretation is made easy by the visual display of the data. In contrast, Kahng et al. (1998) warned that visual

interpretation does not always reveal reliable patterns of behaviour and that complex statistical analysis may be required. Unfortunately, this is often not a viable option in clinical settings where resources and expertise may be limited. Touchette et al. (1998) also argued that although data are collected throughout the day over the course of a week, the actual time required to record the necessary information is minimal. As demonstrated by Kahng et al. (1998), the use of scatter plots may require prolonged periods of data collection and still patterns in behaviour may not be observable. They further warned that this is often not feasible in clinical practice and suggested that clinicians who are prepared to dedicate a significant amount of time to FBA may find it more beneficial to use alternative, more robust methods of analysis. Finally, although scatter plots may identify temporal patterns of responding, they do not provide information regarding the specific antecedents or consequences (Kangh et al., 1998).

Functional Assessment Observation Form (FAOF). The FAOF, developed by O'Neill, Horner, Albin, Storey, and Sprague (1990), combines the visual display of the scatter plot with the recording of ABC data. Each incident of behaviour is plotted on a grid similar to the scatter plot, with time of day plotted along the x-axis and a breakdown of common antecedents and consequences along the y- axis. The FAOF allows the clinician to identify the most prevalent antecedents, behaviours and consequences, while providing a visual display of the temporal relations. The FAOF has been used successfully in community settings to determine the function of behaviour and guide the development of intervention plans which have effectively reduced problem behaviour (Feldman, Condillac, Tough, Hunt & Griffiths, 2002). Although the clinician must have a thorough understanding of ABC data prior to using the FAOF, this tool is user-friendly and provides an effective means of compiling and analyzing ABC data.

Indirect Methods

Indirect methods consist of the use of structured interviews and behaviour rating scales/questionnaires to collect relevant information about the target behaviour from informants who are familiar with the individual exhibiting the challenging behaviour (Neef

& Peterson, 2007). Typically, structured interviews seek to obtain existing information regarding the topography and dimensions of the behaviour (e.g., frequency, intensity and duration), behavioural history, previously used interventions, the combination of setting events and antecedents that reliably predict the occurrence of the problem behaviour, and the consequences that maintain the behaviour (O'Neill et al., 1990). FBA questionnaires provide the informant with a series of situations for them to rate the likelihood of the occurrence of the behaviour. Informants may include family members, teachers, caregivers, and on occasion the client himself (O'Neill et al., 1990). Informants responses' are based on their previous experience with individuals' behaviour, however, there is no direct measurement of the behaviour involved (Lennox & Miltenberger, 1989).

Structured interviews. A number of structured interviews have been published; the most popular being the Functional Assessment Interview (FAI; O'Neill, et al., 1990). There are numerous references to the FAI in the literature (e.g., Arndorfer & Miltenberger, 1994; Newcomer & Lewis, 2004), indicating its widespread use in the assessment of problem behaviour. Although structured interviews provide the clinician with a vast amount of information about the context in which the behaviour occurs this methodology is rarely used in isolation when completing a FBA. The majority of clinicians rely on direct methods that obtain objective information about the behaviour to supplement informant reports in order to determine the function of behaviour. Since these tools are not intended to be used without objective data, the reliability and validity of structured interviews are rarely studied in isolation. One study, published in 1994 by Arndorfer and Miltenberger, has reported on the reliability of the FAI. According to these authors, when information obtained from the FAI was analysed independently, conclusions regarding the function of the behaviour were concordant in each of the five cases.

There are many benefits to using structured interviews to inform FBAs. These tools are extremely time efficient in that they allow a vast amount of information to be collected in a relatively short period of time (Sprague & Horner, 1995). Most often this

information is obtained from those who have spent a great deal of time with the individual and are familiar with the behaviour as well as the history. As noted above, information obtained from these interviews can be used to inform the design of an EFA or direct methods of FBA (Hanley et al., 2003; Sprague & Horner, 1995). The primary disadvantage of this methodology is that it relies heavily on subjective information provided by informants, which in some cases, may be skewed.

FBA questionnaires. Over the past several decades, a number of questionnaires have been developed including: Motivation Assessment Scale (MAS; Durand & Crimmins, 1988), Questions About Behavior Function Scale (QABF; Matson & Vollmer, 1996), Functional Analysis Screening Tool (FAST; Iwata & DeLeon, 1996), Functional Assessment for multiple CausaliTy (FACT; Matson et a., 2003), and the Problem Behavior Questionnaire (PBQ; Lewis, Scott & Sugai, 1994). FBA questionnaires are appealing to clinicians for obvious reasons. These tools are time effective, requiring a fraction of the time necessary to conduct an EFA or descriptive assessment. The minimal amount of time that questionnaires require makes them a practical and economical alternative for clinicians with large case loads. In addition, these tools require minimal training to administer, complete, score and interpret (Floyd, Phaneuf & Wilczynski, 2005). Despite these practical advantages, there are several limitations to the use of FBA questionnaires. Due to the subjective nature of these tools, there is potential that informant bias may lead to inaccurate information (Lennox & Miltenberger, 1989). Without the use of one of the direct methods described above in conjunction with these indirect measures, one is relying strictly on the caregiver's perception of the behaviour. Lastly, evidence of the psychometric weaknesses of these tools has emerged, leading many to question their utility in research and clinical practice.

To date, the most frequently studied questionnaire is the MAS (Durand & Crimmins, 1988). The MAS contains 16 questions describing various situations in which the target behaviour may occur. The informant is asked to rate the likelihood of the target behaviour occurring in each situation on a Likert scale (0 = *Never*, 1 = *Almost Never*, 2 =

Seldom, 3 = *Half the Time*, 4 = *Usually*, 5 = *Almost Always*, 6 = *Always*). The questionnaire is then scored to determine which of the four functions (i.e., attention, escape, sensory, or tangible) the behaviour may be serving.

In the original study by Durand and Crimmins (1988), the authors investigated the inter-rater reliability, test-retest reliability and convergent validity of the MAS using a sample of 50 children who exhibited self-injurious behaviours. Participants were between the ages of 3 and 18 and were diagnosed with moderate to profound ID, many who also had autism. The MAS was administered in interview format by graduate students to two classroom staff (classroom teacher and teachers' assistant) independently, and readministered to the primary rater (classroom teacher) 30 days later. Inter-rater reliability for individual items and for the mean scores of each functional category on the MAS were both found to be significant at the .001 level and ranged from .66 to .92 and .80 to .95 respectively (Durand & Crimmins, 1988). Spearman rank-order correlation coefficients ranged from .66 to .88 and were also significant ($p < .001$). The authors reported significant levels of test-retest reliability ($p < .001$) for mean scores for each of the four functional categories, which ranged from .92 - .98. Furthermore, Spearman's rank order correlations were also significant ($p < .001$), ranging from .82-.99.

Over the past 20 years researchers have made numerous attempts to replicate the findings reported by Durand and Crimmins (1988) and extend the body of literature on the utility of the MAS. A significant amount of attention has since been paid to the reliability of the tool which has been examined in samples of children, adolescents (Sigafoos, Kerr & Roberts, 1994; Zarcone, Rogers, Iwata, Rourke & Dorsey, 1991) and adults (Crawford, Brockel, Schauss & Miltenberger, 1992; Sigafoos, et al., 1994; Spreat & Connelly, 1996) with ID (including autism) who exhibit aggression (Duker & Sigafoos, 1998; Sigafoos et al., 1994), stereotypy (Crawford et al., 1992; Duker & Sigafoos, 1998) self-injury (Duker & Sigafoos, 1998; Spreat & Connelly, 1996; Zarcone et al., 1991) and various forms of disruptive and destructive behaviours (Duker & Sigafoos, 1998). In addition, research has been conducted in residential (Sigafoos et al., 1994; Spreat &

Connelly, 1996; Zarcone et al., 1991), community (Duker & Sigafoos, 1998) and school settings (Duker & Sigafoos, 1998; Zarcone et al., 1991), using teachers (Zarcone et al., 1991), parents (Duker & Sigafoos, 1998), professionals (Sigafoos, et al., 1994) and direct care staff (Sigafoos et al., 1994; Zarcone et al., 1991) as informants.

Findings on inter-rater reliability have been highly inconsistent, particularly when calculated across individual items. For instance, while Sigafoos et al. (1994) reported Pearson correlation coefficients ranging from -.337 to .425 (none of which were significant at the $p < .05$ level), Duker & Sigafoos (1998) later reported coefficients ranging from .225 to .620 ($p < .05$, with 13 coefficients at $p < .001$). Others have reported coefficients ranging from -.30 to .81, however, p values were not reported (Spreat & Connelly, 1996; Zarcone et al., 1991). Similarly, reports on inter-rater reliability for the subscale totals of the MAS have been highly variable. While, Duker & Sigafoos (1998) found moderate levels of correlation – .510 sensory, .369 escape, .115 attention, .494 tangible ($p < .05$, except attention), others reported minimal levels of correlation and have failed to detect any significance (-.008 to .168) (Sigafoos et al., 1994). Finally, Spearman's rank order correlations have been calculated for the primary function determined by the MAS and ranged from .66 to .81 ($p < .001$) (Duker & Sigafoos, 1998). Zarcone et al. (1991) reported correlation coefficients ranging from -.80 up to 1.0, but again, the authors failed to provide p values, restricting the amount of interpretation that can be done. Spreat and Connelly (1996) have suggested that the reliability of the functional hypothesis derived from the tool is more clinically relevant than the aforementioned measures (e.g., individual items, scales), as this is the information utilized by clinicians when designing intervention plans.

One of the limitations of the initial analysis of the MAS was that Durand and Crimmins (1988) relied solely on Pearson correlation coefficients and Spearman rank-order correlations in their reliability analyses. This method of analysis can be misleading since it is possible to obtain a perfect correlation of 1.0 even when two raters did not provide the exact same answer to a given question (Zarcone et al., 1991). For instance, if

one informant consistently rates each item two points lower than the other informant, a correlation of 1.0 would be obtained despite the fact that they did not provide the same rating. Therefore, in addition to the reliability analyses described above, Zarcone et al. (1991) proposed that percent agreement scores (using exact and adjacent methods), a more conservative method of analyses be reported. Since then, several researchers have calculated percent agreement scores in conjunction with Pearson correlation coefficients and Spearman's rank order correlations (e.g., Duker & Sigafoos, 1998). Percent agreement scores have ranged from 0% to 63% for individual items on the MAS, from 8.89% to 12.22% for the subscales and from 29.10% to 70.00% for primary function when calculated using the exact method (Duker & Sigafoos, 1998; Sigafoos et al., 1994; Spreat & Connelly, 1996; Zarcone et al., 1991). Calculations using the adjacent method, the more lenient of the two methods, have yielded somewhat higher scores. More specifically, ranges for percent agreement on items and subscales have been reported as 0% to 88% and 25.56% to 33.33% respectively (Duker & Sigafoos, 1998; Sigafoos et al., 1994; Spreat & Connelly, 1996; Zarcone et al., 1991).

Test-retest reliability has received significantly less attention. In 2003, Barton-Arwood, Wehby, Gunter and Lane administered the MAS to teachers of students with emotional/behavioural disorders on three separate occasions (e.g.,at weeks one, two and six). Pearson correlation coefficients were calculated for individual items and ranged from .39 to .82 across the first and second administration (with 75% significant at $p < .01$), .38 to.83 across the second and third administration (with 67% significant at $p < .01$) and .31 to.65 across the first and third administration (with 71% at $p < .01$). The correlations reported by Barton-Arwood and colleagues (2003) were substantially lower than those reported by Durand and Crimmins (1988). While Durand and Crimmins (1988) cited that 100% of the correlation coefficients exceeded .80, only 6% of those from the Barton-Arwood et al. (2003) study met this standard. Furthermore percentage agreement scores using the exact method consistent levels of agreement between all three administrations (range = 13% - 88%). Using the adjacent method, percentage agreement scores were

elevated and ranged from 38% to 100%. The variability of these findings may be at least partially attributed to a shift of behavioural function over time (Barton-Arwood et al., 2003).

Internal consistency using Cronbach's alpha coefficients have been reported as follows: .72 (sensory), .68 (escape), .86 (attention), .84 tangible (Spreat et al., 1996); and .684 (sensory), .738 (escape), .759 (attention), .867 (tangible) (Duker et al., 1998). Given that these analyses have failed to produce alpha values greater than .80 for all four scales, the internal consistency of the MAS is generally considered inadequate (Spreat & Connelly, 1996).

Construct validity has been investigated in relatively few studies, and has produced more inconsistent results (Duker & Sigafoos, 1998). Recently, Joosten and Bundy (2008) re-examined the construct validity of the MAS using a sample of 67 children with ID, with and without autism who exhibited stereotypical behaviour. Joosten and Bundy (2008) conducted a factor analysis of the MAS which did not support the four factor structure proposed by the original authors.

Overall, studies evaluating the psychometric properties of the MAS have produced inconsistent results, leading to many unresolved questions about the extent to which this tool should be used in clinical practice.

Building upon the foundation of the MAS, Matson & Vollmer (1995) developed the QABF scale. While the QABF and MAS are similar in format, the QABF consists of 25 items, and has an additional subscale to account for challenging behaviour that may be related to pain. Respondents are required to rate the frequency with which the target behaviour occurs on a five-point Likert scale. The QABF produces two scores for each of the subscales. First, the QABF is scored by counting the number of items endorsed in each subscale. These subscale scores are used to develop a hypothesis regarding the function of the target behaviour. Second, the actual scores for each of the items under the five subscales are summed, which provides the clinician/researcher with frequency scores (Matson & Vollmer, 1995).

In 2000, Paclawskyj, Matson, Rush, Smalls & Vollmer completed an initial assessment on the reliability of the QABF within a sample of individuals with severe to profound ID who demonstrated a wide range of problem behaviours (e.g., SIB, aggression, property destruction, tantrums, stereotypy, pica, stealing, elopement). Inter-rater reliability for subscale totals and overall scores were quite high, ranging from .790 to .987 ($p < .01$). Percentage agreement for individual items was between 69.57% and 95.65%, with just over half of the scores at or above 80% (Paclawskj et al., 2000). In an analysis conducted by Nicholson, Konstantinidi and Furniss (2005), Pearson correlation coefficients for individuals items were found to be significant ($p < .01$) and ranged from .248 to .575. Twenty-one out of the 25 were also significant at $p < .001$. Coefficients representing subscale totals for both the severity scale and endorsement scale ranged from .421 (tangible) to .623 (non-social), and .406 (attention) to .55 (physical) respectively, all of which were significant ($p < .001$). Percent agreement scores for individual items were substantially lower than what was reported by Paclawskj et al. (2000) and ranged from 32.20% to 61.80% and 69.49% to 84.75%, using the exact and adjacent methods respectively. Percent agreement scores for the subscales were reported as follows: 33.05% (non-social) to 42.37% (physical) using the exact method; 61.86% (physical) to 73.73% (escape), using the adjacent method. More importantly, agreement on primary and secondary functions as determined by the QABF was 59% and 36% according to the exact method, and 91% and 59% as per the adjacent method. Moreover, researchers also detected significant differences in reliability scores as a function of topography and frequency of behaviour (Nicholson et al., 2000). Nicholson et al. (2005) hypothesized that slight variations in their methodology (e.g., failure to use graduate level students as administrators) may have resulted in the discrepancy between their results and those cited by the original authors. Furthermore, the authors noted that despite these discrepancies, the QABF remained preferable to the MAS (Nicholson et al., 2005).

In order to investigate the test-retest reliability of the QABF, Paclawskyj and colleagues (2000) readministered the tool to informants between one and three weeks following the initial administration. Test-retest reliability was found to be higher than inter-rater reliability with correlation coefficients for subscale scale totals ranging from .795 to .99 ($p < .01$) (Paclawskyj et al., 2000). When percent agreement scores were computed for test-retest reliability, the range was identical to the range reported for inter-rater reliability by the authors (69.57% to 95.65%), with 96% of the scores exceeding the 80% mark. Analyses of internal consistency for individual subscales have produced alpha coefficients ranging from .785 to .928, while values for the entire scale have ranged from .601 to .826 (Nicholson et al., 2005; Paclawski et al., 2000).

In 1999, Matson, Bamburg, Cherry and Paclawskyj evaluated the predictive validity of the QABF with 398 individuals with severe to profound ID who exhibited one of the following target behaviours: aggression, self-injury or stereotypy. Direct care staff served as the informants, and interviewers held a Masters level degree in clinical psychology and had experience working in the field. Matson et al. (1999) reported that the QABF was able to determine a clear behavioural function (defined by the authors as a subscale having a score of four or five endorsements while no other subscales obtaining significant endorsements) in 84% of the sample. A sample of 180 participants whose behavioural function was clearly derived by the QABF were then divided into two groups – one of which received treatment that was designed based on the results of the QABF, the other, a control group which received standard treatment protocols comprised of redirection, response blocking and interruption procedures. Following the six month observation period, results revealed that interventions based on results of the QABF were significantly more effective in reducing the frequency of problem behaviours (e.g., SIB, stereotypy and aggression) when compared to interventions not based on FBA (Matson et al., 1999).

Initial data on the psychometric properties of the QABF for people with ID are promising and many researchers have called for further investigation (e.g., Nicholson, Konstantinidi & Furniss, 2006; Paclawskyj, Freeman, Walker & Kaufman, 2007). In 2009, Singh and colleagues developed the Questions About Behavior Function-Short Form, (QABF-SF), a 15-item version using items from the original QABF. Singh et al. (2009) reported that the QABF-SF retained the five factor structure of the QABF and that internal consistency of the measure was sufficient. To date, this is the only published study on the QABF-SF.

In attempts to gather further information regarding the potential utility of the MAS and the QABF, several studies have examined the extent to which the two scales agree on the functions of problem behaviour (e.g., Shogren & Rojahn, 2003). Spearman's rank order correlation coefficients between functionally analogous scales have been reported to range from .73 (escape) to .89 (sensory) ($p < .001$) in a sample of 20 adults with ID (Shrogen & Rojahn, 2003); .66 (attention, escape) to .76 (tangible) ($p < .01$) in sample of 91 children with ID (Freeman et al., 2007); and .508 (escape) to .857 (tangible) in a sample of 13 individuals with ID (Paclawskyj et al., 2001). Unlike the results presented by Shrogen and Rojahn (2003) and Freeman et al. (2007), only two of the four coefficients were found to be statistically significant in the Paclawskyj et al. (2001) study (.79 and .86, $p < .01$, for the sensory and tangible subscales respectively). It is of interest that the correlation coefficients for the functionally nonanalogous scales ranged from -.135 to .851 across all three studies, with almost 50% of these correlations statistically significant at a minimum of $p < .05$ (Freeman et al., 2007; Paclawskyj et al., 2001; Shrogen & Rojahn, 2003).

In 2009, Wasano, Borrero and Kohn reported on the use of the QABF and the MAS to assess the function of pica displayed by three individuals with ID. Both instruments were completed by parents and the results were then compared to an EFA to confirm hypotheses derived from the informant measures. The authors reported 100% concordance across methods, and it was determined that pica served an automatic

(sensory) function. The agreement amongst the tools reported in this study is encouraging; however, these results should be interpreted with caution since pica is known to often serve a sensory function (Hanley et al., 2003). The authors themselves note that the agreement amongst the methodologies may in part due to the fact that there is little variability with respect to function amongst this particular topography of behaviour (Wasano et al., 2009). In addition, the generality of these results is limited due to the extremely small sample size.

Both the MAS and the QABF have also been evaluated against other FBA methodologies in order to determine concordance of the results. As noted earlier, EFA is the methodology against which descriptive methods are often compared to due to its robust nature. In the second part of their original analysis of the MAS, Durand and Crimmins (1988) selected eight participants from their original sample and further analyzed the function of their behaviours using EFA. The functional hypotheses obtained from the MAS were in agreement with that obtained from the EFA in all eight cases. Cunningham and O'Neill (2000) compared the rank order produced by the MAS and EFA when assessing the challenging behaviour displayed by three young children with ASD. In two out of three cases, these methodologies agreed in terms of the primary function. When a similar comparison was made by Paclawskyj and colleagues (2001) with a sample of 13 individuals with ID, percentage of exact agreement between the two methodologies was a mere 43.8%. In this same study, the results of EFA were also compared to that of the QABF. Results indicated that the percentage of exact agreement was slightly higher at 56.3% (Paclawskyj et al., 2001). A much higher level of concordance was reported by Hall (2005) who found that the QABF and EFA agreed regarding the primary function of behaviour for three out of four participants.

In addition, several researchers have explored the extent to which the results of the MAS and the QABF correspond with the results of other descriptive methods, such as ABC recording. Cunningham and O'Neill (2000) found that the primary function identified by the MAS was consistent with that determined by ABC records for all three participants.

Although, it may be important to note that for one of the participant the ABC analysis identified two primary functions, while the MAS simply identified one. Unfortunately, concordance between the QABF and ABC data has been found to be quite poor – with Hall (2005) citing 0% agreement when these methods were used to assess challenging behaviour of four adults with ID.

Finally, a single study compared the functional hypotheses derived from the MAS and the FAI using a sample of three young children with autism (Cunningham & O'Neill, 2000). For two out of the three participants, the FAI and the MAS agreed on the primary function of behaviour.

According to a survey conducted by Ellingson, Miltenberger and Long (1999), the Functional Analysis Screening Tool (Iwata & DeLeon, 1996) was reported to be the most widely used FBA questionnaire amongst professionals that provide behavioural support for individuals with developmental disabilities at that time. Of interest is that the FAST has never been published and there are no immediate plans do so (B. A. Iwata, November 8, 2007). The FAST contains the following four subscales: (a) social (attention/preferred items), (b) social (escape), (c) automatic (sensory stimulation), (d) automatic (pain attenuation). The format of the FAST differs slightly from the rating scales described above in that the informant is required to respond "yes" or "no" to each of the 16 situations rather than rating the likelihood of each on a Likert scale. Each "yes" answer is given a score of one, while "no" answers are given a score of "0". The sums for each of the four functional categories are calculated and are rank ordered, with the highest score receiving a rank of one, and the lowest, a rank of four. The functional category which receives the highest ranking represents the hypothesized function of the behaviour. Despite the popularity of this instrument, to date there are no published studies regarding its psychometric properties for individuals with or without ASD.

RATIONALE AND PURPOSE OF CURRENT STUDY

It has been over a decade since Horner (1994), in his review of functional behaviour assessment, called for further exploration of more efficient methods of functional behaviour assessment for use in clinical settings. As noted above, many researchers have conducted analyses on the utility of FBA questionnaires, however, unanswered questions remain. Despite the evidence illustrating the weak psychometric properties of FBA questionnaires, there continues to be a heavy reliance on these tools among behaviour analysts working in clinical settings (Ellingson et al., 1999). If clinicians are to continue to rely on FBA questionnaires to develop functional hypotheses for challenging behaviour displayed by individuals with ASD, there is more work to be done in order to fully understand the utility of these tools. It is imperative that we have a better understanding of these tools in order to determine the extent to which the results can be used to guide intervention planning.

This study was designed to inform clinical practice in the selection of functional behavioural assessment tools. The field's over-reliance on questionnaire measures is concerning given the low concordance between questionnaires and other more robust methodologies. The purpose of this study is to determine the degree to which the results of the MAS, the QABF, and the FAST agree when completed by parents of children and youth with ASD who display challenging behaviour.

RESEARCH QUESTIONS

1. What is the prevalence of different functions identified by the FAST, MAS & QABF for maladaptive behaviour seen in a sample of children and youth with ASD?
2. Do the FAST, MAS, & QABF provide similar results in terms of function of maladaptive behaviour for the same child/youth with ASD?
3. What are the relationships of the functionally analogous subscales on the FAST, MAS, and QABF for a sample of children and youth with ASD?

4. What are the relationships of the non-functionally analogous subscales on the FAST, MAS, and QABF for a sample of children and youth with ASD?

METHOD

Participants

Participants were recruited in one of two ways. First, several agencies that provide community behavioural support to families in the Greater Toronto Area were approached and agreed to assist in recruitment for the study including York Simcoe Behaviour Management, Lakeridge Community Support Services, and Durham Behaviour Management. Behaviour consultants on each of these teams who work with families who met the inclusion criteria described above were then sent a letter inviting them to participate (see Appendix A). In addition, the investigator or supervisor met with each of the teams to discuss the details of the study and address any questions or concerns that potential participants may have. Those who agreed to participate were asked to contact the investigator to complete the consent process and review procedures. Signed consents were collected by the agency's administrative assistant and picked up by the researcher. Behaviour consultants then provided the administrative assistant with the names of those who were on their current caseload who met the inclusion criteria for the study. Identified families were sent a letter of invitation by mail and received a follow up call a week later to ensure that the letter was received (see Appendix B). Behaviour consultants were then told that they would be contacted if and when a family on their caseload agreed to participate so that the necessary measures could be completed. They were provided with a script to be used to address any inquiries regarding the study from families who had received the letter of invitation. The script instructed behaviour consultants to redirect families back to the researcher in order to obtain additional information regarding the study. Initially, it was the investigator's intention to compare the results of the FBA questionnaires to the results of the FBA conducted independently by the behavioural consultant. As we recruited few participants through the aforementioned agencies, we decided against using the results of the FBA

conducted independently by the behavioural consultant and omitted the data collected from behaviour consultants.

After several months without any response, the recruitment process was modified to include families who were not connected with a community behaviour support agency. A flyer describing the study was posted on the Autism Ontario website and copies were given to a number of private service providers.

Regardless of the recruitment process, caregivers who were interested in participating in the study or wished to inquire about the study were asked to contact the researcher directly via phone or e-mail. Once caregivers made initial contact with the investigator to express interest in participating, a time was scheduled to discuss the study, review consent forms over the phone and answer any questions. Those who were recruited through Autism Ontario website were sent a copy of the letter of invitation and consents via email at this time. After completing a brief screening in order to ensure that the child/youth met the inclusion criteria for the study, the investigator reviewed the consent forms with the caregiver and answered any questions they might have had with regards to the procedures. Those who were interested in participating in the study scheduled an appointment for the researcher to come to their home so that the measures could be completed.

Participants included eight mothers, and ten children and youth diagnosed with an ASD who exhibited one or more challenging behaviours (e.g., physical aggression towards others, self-injury, property destruction, or other forms of disruptive behaviour). It is important to note that three of the children who participated were from the same family, hence the fewer parent participants. Children or youth with ASD who solely engaged in repetitive or stereotypical behaviour were excluded from the study. This exclusion was made because there is strong support within the literature (e.g., Lovaas, Newsom & Hickman, 1987; Rapp & Vollmer, 2005) that a substantial portion of stereotypical behaviour is maintained by automatic reinforcement and the investigator did not want this

function of behaviour to be overrepresented within the sample. No children whose parents asked to participate were excluded on this basis.

A total of 16 target behaviours were identified by caregivers, and therefore 16 sets of questionnaires were completed for analysis. Two parents completed one set of questionnaires, five parents completed two sets of questionnaires, and one parent completed four sets of questionnaires (one set each for two children, and two sets for the third child). Table 1 illustrates the characteristics of the children and youth in the sample.

Table 1

Diagnosis, Severity of Autism and Support Needs by Participant

Participant	Diagnosis	CARS Range	SIB-R- Support Level
1	Autism	Severe	Extensive
2	Autism	Severe	Pervasive
3	PDD-NOS	Mild – Moderate	Intermittent
4	Autism	Severe	Limited
5	Autism	Severe	Frequent
6	Autism	Severe	Extensive
7	Autism	Severe	Extensive
8	PDD-NOS	Mild – Moderate	Frequent
9	PDD-NOS	Mild – Moderate	Frequent
10	Asperger's Disorder	Mild – Moderate	Frequent

Children and youth participants, ranged in age from 6 years, 2 months to 18 years of age (M = 12 years, 6 months). Nine out of the 10 participants with ASD were male. The support need level identified by the Scales of Independent Behavior-Revised (Bruininks, Woodcock, Weatherman, & Hill, 1996) shows that there was a range of adaptive skills and support needs in this sample. The severity of autism was measured by the Childhood Autism Rating Scale (Schopler, Reichler & Renner, 1988), with scores ranging from 31.5 to 47.5 (M = 38.5). A score within the range of 30.0 to 36.5 signifies

mild to moderate autism, while a score greater than or equal to 37.0 implies moderate to severe autism. Parent reports indicate that 60% of the sample had a diagnosis of Autistic Disorder, 30% had a diagnosis of PDD-NOS, and 10% a diagnosis of Asperger's Disorder. Other diagnoses indicated by the caregiver included ID (n = 2), Anxiety Disorder (n = 2), Bipolar Disorder (n = 1), and Obsessive Compulsive Disorder (n = 1).

Target behaviours identified by the caregivers were organized into the following categories: (a) physical aggression (e.g., hitting/kicking others), (b) self-injurious behaviour (e.g., striking self in the face with an open hand), (c) property destruction (e.g., tearing pages out of a book) and (d) disruptive behaviour (e.g., masturbation is public areas). Of the 16 target behaviours selected by caregivers, 31% were classified as physical aggression, 25% as SIB, 19% as property destruction and 25% as disruptive behaviour. Total scores on the Target Behaviour Rating Scale ranged from 6 to 28 with a mean score of 17. Total scores for frequency on the Target Behaviour Rating Scale ranged from 2 to 7 with a mean score of 4.6 (out of a possible 7). The characteristics of the target behaviours along with the General Maladaptive Behaviour Severity Indices from the SIB-R of the can be reviewed in Table 2.

Table 2

Characteristics of Challenging Behaviour

Partici-pant	Target Behaviour	Total Score - Target Behaviour Rating Scale	Frequency - Target Behaviour Rating Scale	General Maladaptive Behaviour Severity-SIB-R
1	Property destruction	19	7	Marginally Serious
1	SIB	19	4	--
2	Disruptive behaviour	16	4	Very Serious
2	Physical aggression	13	2	--
3	Disruptive behaviour	9	3	Marginally Serious
4	SIB	6	3	Serious
4	Property destruction	12	5	--
5	SIB	17	4	Moderately Serious
5	Disruptive behaviour	16	5	--
6	Physical aggression	17	4	Moderately Serious
6	Property destruction	18	4	--
7	Physical aggression	17	4	Moderately Serious
8	Disruptive behaviour	28	7	Marginally Serious
9	Physical aggression	23	5	Marginally Serious
9	SIB	21	5	--
10	Physical aggression	27	7	Marginally Serious

The caregivers were eight mothers of children/youth with ASD. Table 3 depicts mothers' educational backgrounds and occupational classifications.

Table 3

Educational Backgrounds and Occupational Classifications of Caregivers

Participant	Highest Level of Education	Occupational Classification
1	High School Diploma	Transportation and Communications
2	Bachelor's Degree	Homemaker
3	Doctoral Degree	Professional
4	Bachelor's Degree	Professional
5	Bachelor's Degree	Healthcare
6	High School	Homemaker
7	College Diploma	Healthcare
8	College Diploma	Healthcare
9	College Diploma	Healthcare
10	College Diploma	Healthcare

Setting

Caregivers completed the measures in their home with the researcher present, and children were observed during the same visit. All families resided in residential communities in upper-middle class suburban neighbourhoods throughout various regions of Southern Ontario (e.g., Niagara Region, Durham Region, Halton Region, York Region and Brant County).

Measures

Childhood Autism Rating Scale

The Childhood Autism Rating Scale (CARS; Schopler, et al., 1988) is a 15 item tool used by trained professionals to identify autistic disorder in children over the age of two. In addition to identifying autism, the CARS (Schopler, et. al., 1988) also provides professionals with a quantifiable measure of symptom severity. After gathering

information from observations, clinical reports and interviews with caregivers, the examiner must rate the extent to which the behaviour exhibited by the child is age appropriate (1 = *normal for age*, 4 = *highly abnormal for age*). Upon completion, the scores for each of the fifteen items are summed to produce a total score. A total score greater than or equal to 30.0 is indicative of a diagnosis of autistic disorder. Furthermore, a score within the range of 30.0 to 36.5 signifies mild to moderate autism, while a score greater than or equal to 37.0 implies moderate to severe autism. The severity score obtained from the CARS was used to define the sample of children and youth participating in the study.

The CARS has demonstrated high levels of reliability and has proven to be a valid measure of autism severity (Schopler et al., 1988). More specifically, test-retest reliability of the CARS is .88, and criterion-related validity has been shown to be in the range of .80 to .84. Finally, internal consistency of the measure is high (Cronbach α = .94) (Schopler, et al., 1988).

Scales of Independent Behavior-Revised, Short Form

The Scales of Independent Behavior-Revised, Short Form (SIB-R; Bruininks, et al., 1996) measures functional independence and adaptive functioning levels in a variety of environments including home, educational, work and community. The SIB-R has been normed for use with individuals from the age of 3 months to over 80 years and can be used to assess individuals with or without developmental disabilities. The SIB-R short form takes approximately 15 to 20 minutes to complete and can be administered in questionnaire format. This too, was used to define the sample, specifically in terms of level of adaptive functioning.

Target Behaviour Rating Scale

The Target Behaviour Rating Scale (Feldman et al., 2002) is a brief questionnaire used to gather information on the dimensions of the target behaviour – frequency, intensity, duration, and discrimination. Caregivers are asked to rate the target behaviour based on these four dimensions using a seven-point Likert-type scale. The

scores from each of the four scales are then summed to obtain the severity rating for a given target behaviour. Total scores can range from 4 to 28, with higher scores indicating more severe behaviours. The Target Behaviour Rating Scale simply provided the investigator with quantifiable measurements of the dimensions of the target behaviour displayed by participants. The scale has yet to be published and information on the psychometric properties is not available at this time.

Demographics Questionnaire – Caregivers

A brief demographics questionnaire was developed by the investigators in order to obtain basic information about the caregivers and the children and youth who participated in the study (see Appendix C). The following information was collected in order to define the sample: education and discipline, occupation, child's date of birth, agency from which they were receiving behaviour consultation, and current interventions being used.

Motivation Assessment Scale

The MAS is a 16-item questionnaire used to identify the potential source(s) of reinforcement maintaining challenging behaviour displayed by individuals with ID. The MAS can be administered interview format, or completed independently by caregivers, teachers or professionals. There are four items representing each of the four functional categories – attention, escape, tangible and sensory. Each of items describes a scenario in which the target behaviour may occur. For each item, the respondent is required to rate the likelihood that the specified behaviour would occur using a seven-point scale (0 = *never*, 1 = *almost never*, 2 = *seldom*, 3 = *half the time*, 4 = *usually*, 5 = *almost always*, 6 = *always*). Following the completion of the measure, the scores for each of the questions under each of the functional categories listed above are summed to obtain the subscale scores. The mean for each of the subscales is then calculated by dividing each of the subscale scores by four and the relative rankings are assigned accordingly, with the highest mean score receiving a rank of one, and so on. In cases where two of the functional categories are tied or the mean scores are within .25 to .50 of each other, both

categories are given an equal ranking, however; if three or more functional categories received high scores, the authors suggest that the tool was completed incorrectly. See above for a review of the psychometric properties of this instrument.

Questions About Behavior Function Scale (QABF)

The QABF contains 25 statements describing the various conditions under which a challenging behaviour may occur (Matson & Vollmer, 1995). Each of these 25 items falls under one of the following five subscales: non-social, tangible, attention, escape and physical (pain/discomfort), each of which contains five items. Informants must indicate the frequency with which the behaviour occurs under the conditions described using a five -pointscale (X = *Does not apply*, 0 = *Never*, 1 = *Rarely*, 2 = *Some*, 3 = *Often*). The QABF produces two scores for each of the subscales. First, the QABF is scored by counting the number of items endorsed in each subscale. These subscale scores are used to develop a hypothesis regarding the function of the target behaviour. In addition, the actual scores for each of the items under the five subscales are summed to provide the clinician/researcher with severity scores. Both the number of endorsements for each scale, along with the severity scores are then plotted on the scoring sheet which provides the researcher/clinician with a visual representation of the results. According to the authors of the tool, "a clear function is considered an endorsement of four or five of the items endorsed with no other subscales containing significant endorsements." (Matson & Vollmer, 1995, p. 7). See above for a review of the psychometric properties of this instrument.

Functional Analysis Screening Tool

The FAST (Iwata & DeLeon, 1996) was designed to assist clinicians and researchers in developing hypothesis regarding the function of challenging behaviour. The FAST contains 16 items describing various scenarios in which the target behaviour may or may not occur. Each of these items corresponds to one of the following four functional categories: (a) social (attention/preferred items), (b) social (escape), (c) automatic (sensory stimulation), (d) automatic (pain attenuation). Informants are required

to answer "yes" or "no" to each item. Each "yes" answer is given a score of one. The sums for each of the four functional categories are calculated and are rank ordered, with the highest score receiving a rank of one, and the lowest, a rank of four. The functional category which receives the highest ranking represents the hypothesized function of the behaviour. No further instructions on interpreting the results are available and at present, there are no published psychometric studies for this tool.

Procedures

At the beginning of the home visit with the family, the consent forms were reviewed and caregivers were provided with the opportunity to ask any additional questions in regards to the study. The consent forms were then signed and collected. The investigator attempted to obtain verbal assent from the child or youth, however, due to the impairments in communication and cognitive limitations experienced by some of those participating, this was not possible in every case (see Appendix D). For those who were unable to communicate, the individual's behaviour was used to gauge their tolerance for interaction with the investigator and the research assistant. The investigator then proceeded to review the procedures with the caregiver while the research assistant spent time observing the child or youth.

Before filling out the measures, caregivers were required to identify a target behaviour to be assessed using the FBA questionnaires. More specifically, caregivers were asked to select a challenging behaviour that their child currently engages in that interferes with the child's functioning and falls into one of the following four categories: (a) aggression, (b) SIB, (c) destructive behaviour, (d) disruptive behaviour. Those receiving behaviour consultation from one of the community agencies mentioned above were asked to use the target behaviour(s) that was being assess/had been assessed by their consultant. In cases where a parent participant identified more than two target behaviours, she was instructed to prioritize the one or two behaviours which they considered to be the most problematic.

Following the identification of the target behaviour, an operational definition describing what the individual says or does while engaging in the behaviour using observable and measurable terms was written. Families who were associated with a behaviour consultant were provided with the operational definition obtained from their consultant. In each case, the definition was written at the top of the Target Behaviour Rating Scale, the first measure to be completed, and remained in front of the parent participant throughout the data collection period for their reference.

The measures were completed by the caregiver in the following order: (a) Target Behaviour Rating Scale; (b) FBA Questionnaire, FAST; (c) Demographics Questionnaire; (d) FBA Questionnaire, MAS or QABF; (e) Scales of Independent Behavior Revised – Short Form; (f) FBA Questionnaire, MAS or QABF. Since the FAST has the least published data, researchers wanted to have it completed first to ensure a "clean" administration. The order of presentation for the other two FBA questionnaires was counterbalanced in attempt to minimize ordering effects. The remaining measures (Demographics Questionnaire and SIB-R) were inserted between the FBA questionnaires in attempt to reduce carry-over effects. Further, the scoring of the FBA questionnaires was not completed during the home visit in order to ensure that the caregiver remained blind to the results of each questionnaire so as not to influence their responses to the questionnaires that followed.

Parent participants who identified a second target behaviour were asked to complete an abbreviated version of the original package containing only the FBA questionnaires and the Target Behaviour Rating Scale. The Demographics Questionnaire and the SIB-R did not need to be repeated as they provided more general information about the child or youth rather than specific information relating to the target behaviour. The measures were presented in the following order: (a) Target Behaviour Rating Scale; (b) FBA Questionnaire, FAST; (c) FBA Questionnaire, MAS or QABF; (d) FBA Questionnaire, MAS or QABF. During the completion of the abbreviated set of measures, the researcher paused between the presentation of each of the FBA questionnaires to

ask the caregiver several questions relating to the CARS. This served multiple purposes. First, it allowed the investigator to obtain information about the child or youth necessary for the completion of the CARS that was not observable during the home visit (e.g., sleep habits). Second, it served as a neutralizing routine, similar to the insertion of the Demographics Questionnaire and SIB-R described above, to reduce carry-over effects.

All measures were administered in questionnaire format. The investigator provided caregivers with one measure at a time and reviewed the instructions for each tool verbally, immediately prior to its completion. Caregivers were permitted to seek clarification regarding the wording of the questions and/or expectations while completing the tools, but the investigator refrained from providing input with regards to how to respond to individual questions. None of the parent participants provided any indication that they were having difficulty completing the measures (e.g., visibly struggling, remaining on a single question for a prolonged period of time). The researcher remained with the parent participant during the completion of the measures except for a brief period of time during the completion of the SIB-R, where the investigator joined the research assistant to observe the child or youth and complete the CARS.

Following the completion of the measures, families were provided with financial compensation ($50.00) for their time. It is of interest to note that in several instances, the caregivers requested that the compensation be given directly to the child/youth participant to either be spent as they wished or to be deposited into a bank account in the child/youth's name.

The results of the CARS and SIB-R were not shared with the families who participated in the study and were completed strictly for the purposes of providing descriptive information regarding the sample. A summary of the overall results of the study will be written and provided to the caregivers as well as the two behaviour consultants involved within 3 months after the completion of the study, and any questions will be answered accordingly (see Appendix E).

Scoring Procedures

The MAS and QABF were scored according to the procedures described by their respective authors in order to produce rankings of the hypothesized functions of the target behaviours. Since the FAST has not yet been published, a manual outlining scoring and interpretation is not available. Therefore, the total number of endorsements for each functional category were tallied and rank ordered, with the highest score receiving a rank of "1" and the lowest score receiving a rank of "4". Functional categories with the same number of endorsements were assigned equal rankings. All questionnaires were scored by the researcher.

Each of the questionnaires uses slightly different but overlapping functional categories. The subscales used in the MAS, FAST and QABF and the number of items per subscale are reviewed in Tables 4 and 5 respectively. The QABF includes the most functional categories, the majority of which are represented within the other two questionnaires. While the FAST and the QABF both include a subscale for physical discomfort implying an automatic negative reinforcement function, this function is not represented within the MAS. It is important to note that the FAST combines the more commonly used categories of "Attention" and "Tangible" to form a category referred to as social (attention/preferred items).

Table 4

Functionally Analogous Scales for the MAS, QABF and FAST

	Questionnaire		
Functional Category	MAS	QABF	FAST
Attention	Attention	Attention	Social (attention/preferred items)
Tangible	Tangible	Tangible	Social (attention/preferred items)
Escape	Escape	Escape	Social (escape from tasks/activities)
Sensory Stimulation	Sensory	Non-Social	Automatic (sensory stimulation)
Physical Discomfort	N/A	Physical	Automatic (pain attenuation)

Table 5

Number of Items in Each of the Functional Categories for the QABF, FAST and MAS

	Questionnaire		
Functional Category	MAS	QABF	FAST
Attention	4	5	4[a]
Tangible	4	5	
Escape	4	5	4
Sensory Stimulation	4	5	4
Physical Discomfort	N/A	5	4

Note. [a]functional categories combined to form a single subscale.

RESULTS

The following section will review the results for each of the research questions listed above.

1. What are the functions identified by the FAST, MAS and QABF in this sample of children and youth with ASD?

Table 6 illustrates the rankings for each function determined by the FAST, MAS and QABF across participants with ASD. When two or more functions were tied, the mean of that ranking along with the next lowest ranking was calculated and assigned to both functions. As seen in Table 6, the target behaviours appear to be multiply determined (i.e., served several functions) for the vast number of participants with ASD. More specifically, multiple primary functions were identified by the MAS for 25% of participants (n = 4), by the QABF for 43% of participants (n = 7), and by the FAST for 50% of participants (n = 8). In addition, there were a significant number of ties for secondary and tertiary functions among all three instruments. In some cases, the difference in scores between the first and second ranking was quite small; however, this was not consistent across all participants.

The proportion of cases in which each of the functions was identified as the primary function was calculated for each measure. This was done by taking the total number of cases that identified a given function, divided by the total number of cases (n = 16), and multiplying by 100. Since there was high prevalence of multiply determined behaviours, the sum of the percentages for the FAST, MAS and QABF are greater than 100%. For the MAS, the most common primary function identified was sensory, with 56% of the target behaviours said to have served this function (n = 9). According to the MAS, the percentage of target behaviours serving tangible, escape and attention functions were 31% (n = 5), 25% (n = 4) and 13% (n = 2) respectively. In comparison, the QABF identified a physical function in 44% of cases (n = 7), and a sensory function in 44% of cases (n = 7). Similar to the trend observed with the MAS, while escape and tangible were identified as the primary function for 38% (n = 6) and 31% (n = 5) of target behaviours respectively, in only 6% (n = 1) of cases was attention ranked as the primary function. With respect to the FAST, the category identified as the primary function most frequently was social (attention/preferred items), accounting for 56% (n = 9) of cases. social (escape) and automatic (sensory stimulation) were the next most common primary functions, with 43% (n = 7) and 38% (n = 6) of target behaviours serving these functions. Automatic (pain attenuation) was ranked as the primary function for only 6% (n = 1) of the target behaviours.

Based upon visual inspection of Table 6 the functions of the target behaviours determined by each of the tools are usually different. This trend will be reviewed in detail in next section.

Table 6

Rankings for Functions for Each Participant Determined by the MAS, QABF, and the FAST

Participant	Target Behaviour	Questionnaire		
		MAS	QABF	FAST
1	Property destruction	1 Attention 2 Sensory 3.5 Escape 3.5 Tangible	1.5 Attention 1.5 Non-Social 3.5 Tangible 3.5 Physical 5 Escape	1.5 Attention/Tangible 1.5 Sensory Stimulation 3.5 Escape 3.5 Pain Attenuation
1	SIB	1.5 Sensory 1.5 Tangible 3 Escape 4 Attention	1 Physical 2 Tangible 3.5 Attention 3.5 Escape 5 Non-Social	1 Attention/Tangible 2 Sensory Stimulation 3.5 Escape 3.5 Pain Attenuation
2	Disruptive behaviour	1 Sensory 2 Attention 3.5 Escape 3.5 Tangible	1 Non-Social 2.5 Attention 2.5 Escape 4 Physical 5 Tangible	1 Sensory Stimulation 2.5 Attention/Tangible 2.5 Escape 4 Pain Attenuation
2	Physical aggression	1.5 Attention 1.5 Escape 3.5 Sensory 3.5 Tangible	1 Physical 2 Non-Social 3.5 Attention 3.5 Escape 5 Tangible	1.5 Sensory Stimulation 1.5 Escape 3 Attention/Tangible 4 Pain Attenuation

3	Disruptive behaviour	1.5 Tangible 1.5 Escape 3 Attention 4 Sensory	1 Escape 2.5 Attention 2.5 Tangible 4 Non-Social 5 Physical	1.5 Attention/Tangible 1.5 Escape 3 Pain Attenuation 4 Sensory
4	SIB	1 Escape 2 Tangible 3.5 Attention 3.5 Sensory	1 Tangible 2.5 Escape 2.5 Physical 4.5 Attention 4.5 Non-Social	1 Escape 2 Attention/Tangible 3 Pain Attenuation 4 Sensory Stimulation
4	Property destruction	1 Sensory 3 Attention 3 Escape 3 Tangible	1 Non-Social 3.5 Attention 3.5 Tangible 3.5 Escape 3.5 Physical	1 Sensory Stimulation 2.5 Attention/Tangible 2.5 Escape 4 Pain Attenuation
5	SIB	1.5 Escape 1.5 Tangible 3 Sensory 4 Attention	1.5 Escape 1.5 Tangible 3.5 Attention 3.5 Physical 5 Non-Social	1.5 Sensory Stimulation 1.5 Pain Attenuation 3 Attention/Tangible 4 Escape
5	Disruptive behaviour	1 Sensory 3 Attention 3 Escape 3 Tangible	1 Non-Social 3.5 Attention 3.5 Escape 3.5 Physical 3.5 Tangible	1 Sensory Stimulation 3 Attention/Tangible 3 Escape 3 Pain

6	Physical aggression	1 Tangible 2 Sensory 3.5 Escape 3.5 Attention	1 Physical 2.5 Escape 2.5 Tangible 4.5 Attention 4.5 Non-Social	1 Attention/Tangible 2.5 Sensory Stimulation 2.5 Pain Attenuation 4 Escape
6	Property destruction	1 Sensory 2 Escape 3 Tangible 4 Attention	1 Physical 2 Escape 3 Attention 4 Tangible 5 Non-Social	1.5 Attention/Tangible 1.5 Escape 3 Sensory Stimulation 4 Pain Attenuation
7	Physical aggression	1 Tangible 2 Escape 3.5 Sensory 3.5 Attention	1.5 Escape 1.5 Tangible 3.5. Attention 3.5 Physical 5 Non-Social	1.5 Attention/Tangible 1.5 Escape 3. Pain Attenuation 4 Sensory Stimulation
8	Disruptive behaviour	1 Sensory 2 Escape 3.5 Attention 3.5 Tangible	2 Tangible 2 Escape 2. Non-Social 4.5 Physical 4.5 Attention	1 Attention/Tangible 2 Sensory Stimulation 3 Escape 4 Pain Attenuation
9	Physical aggression	1 Sensory 3 Attention 3 Tangible 3 Escape	2.5 Escape 2.5 Tangible 2.5 Non-Social 2.5 Physical 5 Attention	1 Escape 2 Attention/Tangible 3.5 Sensory Stimulation 3.5 Pain Attenuation

9	SIB	1	Sensory	1.5	Physical	1.5	Attention/Tangible
		3	Attention	1.5	Non-Social	1.5	Escape
		3	Tangible	3.5	Escape	3	Sensory Stimulation
		3	Escape	3.5	Tangible	4	Pain Attenuation
				5.	Attention		
10	Physical	1	Sensory	1.5	Physical	1	Attention/Tangible
	aggression	2	Escape	1.5	Escape	2.5	Escape
		3	Tangible	3.5	Non-Social	2.5	Sensory Stimulation
		4	Attention	3.5	Tangible	4	Pain Attenuation
				5	Attention		

Note. Same numbers indicate ties.

2. Do the FAST, MAS, and QABF provide similar results for the same child/youth with ASD?

In order to answer this research question, percentage agreement for primary function was calculated between each of the instruments. It was decided that percentage agreement would be calculated solely for the primary function as it is most clinically relevant when designing intervention based on the results of an FBA (Kwak, Ervin, Anderson & Austin, 2004; Spreat & Connelly, 1996). Due to the high percentage of ties for primary function, percentage agreement was calculated in two ways. First, using the exact method, agreement was calculated by taking the number of cases in which the measures identified the same primary function(s) (including ties), divided by the total number cases, and multiplied by 100 in order to obtain a percentage. For example, for participant one, the MAS identified the primary function as being attention, while the QABF identified attention and non-social as the primary functions. Using the method described above, this would not be considered to be an agreement because the MAS identified only one similar function to the QABF (the addition of the tied non-social function in the QABF negates the agreement on the attention function between the MAS and QABF). The highest percent agreement was found between the MAS and the FAST,

which agreed on the primary function for 37.50% of cases. Agreement between the QABF and the FAST was slightly lower at 31.25%, while the lowest agreement was between the MAS and the QABF at only 25.00%.

The second method by which percentage of agreement was calculated was by dividing the number of agreements between *each* primary function identified by the total number of primary functions, and multiplying by 100 in order to obtain a percentage. Again, using participant one as an example, since both tools identified attention as a primary function, one agreement would be scored. In addition, the QABF identified non-social as a primary function whereas the MAS did not, therefore, this is also considered to be a disagreement. Using this method, percentage agreement scores were slightly higher compared to those derived from the exact method, but remain considerably lower than anticipated. More specifically, agreement between the MAS and FAST was 45.83%, the agreement between the QABF and FAST was 39.29% and the agreement between the MAS and QABF was 37.93%.

It is of interest that when primary functions determined by all three of the instruments were compared, overall agreement between the three was 18.75%. For the three participants where the FAST, QABF and MAS agreed on the primary function of behaviour, in each case the source of reinforcement was sensory stimulation. Furthermore, in only one of these three instances did the instruments agree on what was *not* the function of behaviour.

Given the high number of disagreements, a comparison of primary functions was completed across both analogous and non-analogous subscales in order to determine if any patterns emerged. A detailed comparison of the primary functions identified by the MAS and QABF can be viewed in Table 7. When the MAS and QABF results were compared visually, it was clear that for all primary functions it was more likely that the function would be other than the expected analogous scale. The most frequent agreement was between MAS sensory subscale and the QABF non-social subscale,

although there was a higher likelihood that a sensory function detected by the MAS would be scored as either physical, escape or tangible on the QABF.

Table 7

Comparison of Primary Functions Identified by the MAS and QABF across Participants

	MAS			
QABF	Attention	Tangible	Escape	Sensory
Attention	**1**	0	0	0
Tangible	0	**2**	2	3
Escape	0	3	**2**	4
Non-Social	1	0	0	**6**
Physical	1	1	1	5

Note. Agreements among functionally analogous scales are in bold.

When examining the patterns of agreement and disagreement between the scales on the MAS and FAST (seen in Table 8), the functionally analogous scales with the highest level of agreement on primary function were the MAS sensory stimulation with FAST automatic (sensory stimulation) and the MAS tangible with the FAST social (attention/preferred items). Although, when the MAS identified a sensory function, the FAST was more likely to identify a socially mediated function such as attention/preferred items or escape.

Similar results emerged when the primary functions across the QABF and the FAST were compared (see Table 9). The functionally analogous subscales with the highest levels of agreement were the FAST automatic (sensory stimulation) and the QABF sensory subscales. Although physical discomfort (physical/pain attenuation) was identified as the primary function of behaviour for a number of participants, there was not a single occasion in which the FAST and QABF agreed on this function. In fact, when the QABF indicated a physical function, the FAST most often identified a socially mediated function (e.g., attention/preferred items, escape).

Table 8

Comparison of Primary Functions Identified by the MAS and FAST across Participants

	MAS			
FAST	Attention	Tangible	Escape	Sensory
Social (attention/preferred items)	**1**	**4**	1	5
Social (escape from tasks/activities)	1	2	**3**	3
Automatic (sensory stimulation)	2	1	2	**4**
Automatic (pain attenuation)	0	1	1	1

Note. Agreements among functionally analogous scales are in bold.

Table 9

Comparison of Primary Functions Identified by the QABF and FAST across Participants

	QABF				
FAST	Attention	Tangible	Escape	Non-Social	Physical
Social (attention/preferred items)	**1**	**2**	4	3	5
Social (escape from tasks/activities)	0	3	**3**	2	4
Automatic (sensory stimulation)	1	1	1	**4**	1
Automatic (pain attenuation)	0	1	1	0	**0**

Note. Agreements among functionally analogous scales are in bold.

While it was hypothesized that there would be high levels of agreement between each of the instruments, this clearly was not the case. For most participants, the primary function determined by the MAS, QABF and FAST did not align and few clear patterns emerged when frequency of agreements and disagreements were examined.

3. What are the relationships of the analogous subscales on the FAST, MAS, and QABF for a sample of children and youth with ASD?

In the current study, correlation coefficients amongst functionally analogous scales on the MAS and QABF ranged from .32 (attention) to .66 (tangible) and are depicted in Table 10. Only two of the four correlations coefficients for functionally

analogous scales were found to be statistically significant with both tangible and escape subscales showing positive moderate relationships. Moderate positive correlations were also found for the attention and sensory subscales, although neither was statistically significant. Rankings assigned to the tangible subscales by the MAS and the QABF aligned for two participants. Those that did not align exactly, differed by less than or equal to one and a half, with the ranking produced by the QABF consistently lower. The difference between rankings on the escape subscales was less than or equal to one and a half, except in a single case where the discrepancy was slightly larger. For approximately half of the participants, escape was ranked higher on the QABF.

Table 10

Spearman's Rank Order Correlations for the Subscales of the MAS and the QABF.

	MAS			
QABF	Attention	Tangible	Escape	Sensory
Attention	**.32**	-.14	-.10	-.30
Tangible	-.51*	**.66****	.37	-.44
Escape	-.54*	.43	**.54***	-.23
Non-Social	.77**	-.71**	-.46	**.48**
Physical	-.32	.16	-.04	.05

Note. Correlation coefficients for functionally analogous scales are in bold.
* $p < .05$, 2-tailed. ** $p < .01$, 2-tailed.

In order to explain the lack of significant correlations for the MAS and QABF attention subscales, and between the MAS sensory and QABF non-social subscales, a closer examination of the pattern of agreements and disagreements was necessary (see Table 6). With respect to the attention subscales, there was only one instance in which the rankings designated by the MAS and the QABF were the same. For all other participants, the rankings for attention differed by one half to two rankings. For the

majority of participants, the QABF attention subscale was ranked lower than the MAS attention subscale. A similar pattern was observed for the sensory subscales, with only two cases where the rankings from the MAS and QABF agreed. The remainder of the rankings disagreed by one half to one and a half positions; again, with the QABF ranking tangible lower in comparison to the MAS for the majority of participants.

Spearman's rank order correlations were completed for functionally analogous scales on the MAS and FAST and are presented in Table 11. These yielded even weaker correlations than the MAS and QABF, with coefficients ranging from -.44 (attention) to .42 (escape). Though none of these correlations were found to be statistically significant, two moderate correlations were found to be noteworthy. A moderate positive correlation was detected between the MAS escape and the FAST social (escape) subscales. Although there were several cases in which the instruments identified the same ranking, the actual position varied. In approximately half the cases, the FAST identified the higher ranking, with the MAS identifying the higher ranking for the other half. For the most part, rankings were off by one half to one and a half rankings; however, for two participants the discrepancy was greater than or equal to two.

It is interesting to note that a moderate negative correlation was found between the MAS attention subscale and the FAST social (attention/preferred items) subscale. Visual inspection of the relative rankings confirmed that for the majority of participants, attention was ranked last or second to last by the MAS. Alternatively, the FAST social (attention/preferred items) subscale received higher rankings, and in many cases, was designated as the primary function. A further examination of the items on these subscales revealed substantial differences in the number of questions as well as the content of questions. More specifically, the FAST social (attention/preferred items) subscale includes a total of four questions – one that includes (e.g., "...when the person is not receiving attention or when caregivers are paying attention to someone else?"), two that include references to accessing both social attention *and* preferred items (e.g., "...do caregivers usually try to calm the person down or involve the person in preferred

activities?"), and the final item, which only makes reference to accessing tangible items without any mention of accessing attention (e.g., "...when the person's requests for preferred items or activities are denied or taken away?"). In contrast, the MAS attention subscale relies solely on questions pertaining to obtaining social attention (e.g., "...whenever you stop attending to the person?").

Table 11

Spearman's Rank Order Correlations for the Subscales of the MAS and the FAST

	MAS			
FAST	Attention	Tangible	Escape	Sensory
Social (attention/preferred items)	**-.44**	**.23**	-.18	.08
Social (escape from tasks/activities)	.19	-.08	**.42**	-.09
Automatic (sensory stimulation)	.32	-.51*	-.43	**.38**
Automatic (pain attenuation)	-.21	.74**	.14	-.60*

Note. Correlation coefficients for functionally analogous scales are in bold.

* $p < .05$, 2-tailed. ** $p < .01$, 2-tailed.

A review of the rankings for the MAS tangible and FAST social (attention/preferred items) subscales revealed that there were few cases in which these two scales received the same ranking. Furthermore, for the vast majority of cases, the MAS tangible scale was designated a lower ranking. The extent to which these two instruments differed in their rankings of these subscales varied from one half to two and a half full rankings, in a non-systematic fashion. Patterns in the differences in the number and content of the items on these subscales are similar to what was described above.

The opposite was true for the sensory subscales, with the FAST ranking this function lower than the MAS most often. The discrepancy in rankings ranged from one half to two and a half rankings. Three out of the four occasions in which the functions derived from these tools aligned, sensory was deemed the primary function.

Spearman's rank order correlation coefficients for the QABF and the FAST can be found in Table 12. Correlation coefficients for functionally analogous scales ranged from -.13 (physical) to .60 (sensory). Only one of the five correlation coefficients for these subscales was found to be statistically significant; a positive moderate relationship was identified between the FAST automatic (sensory) and QABF non-social subscales. The correlation coefficients for the remainder of the functionally analogous scales were in the moderate to weak range. The rankings for the FAST automatic (sensory) and QABF non-social subscales aligned for a total of six participants, and in four of these instances, the sensory subscale was designated as the primary function. For those cases where the rankings did not correspond, the difference in rankings varied by one half to three and one half positions, with the QABF frequently assigning the lower ranking.

Again, in order to explain the correlation coefficients for the functionally analogous scales that were not found to be significant, a careful review of the patterns of the rankings by both instruments was necessary. Examination of these relationships for escape subscales revealed that rankings diverged by one half to two and one half rankings, with the higher ranking oscillating back and forth between the QABF and the FAST. For three participants, the ranks derived from the FAST and QABF were in agreement. The discrepancy between rankings for the tangible subscale also ranged from one half to two and one half rankings; however, in this case, the QABF consistently produced the lower ranking.

The correlation coefficient for QABF attention and FAST social (attention/tangible) subscale revealed a weak negative relationship. More specifically, as the rank for this scale increased on the FAST, it decreased on the QABF. Discrepancies between the rankings varied as much as four positions. It is important to note that a

similar trend emerged when comparing the MAS attention and the FAST social (attention/preferred items) subscales.

A weak negative relationship was also found between the QABF physical scale and the FAST automatic (pain attenuation) scale. Differences in rank amongst these two subscales ranged from one half to three positions. For 9 out of the 16 participants, the FAST yielded the lower ranking. The FAST rarely assigned this subscale a ranking higher than three, while the QABF ranked this subscale as the primary function for six participants. Again, a review of the content of the items on these subscales indicated noticeable differences between the instruments. For instance, while the QABF physical subscale inquires about the occurrence of behaviour in response to general pain and discomfort (e.g. "...because he/she is in pain.", the FAST incorporates items relating to more specific conditions (e.g., "Does the person have recurring painful conditions such as ear infections or allergies?") that may be responsible for the behaviour.

Table 12

Spearman's rank order correlations for the subscales of the QABF and the FAST

	QABF				
FAST	Attention	Tangible	Escape	Non-Social	Physical
Social (attention/preferred items)	**-.26**	**.25**	.22	-.36	.21
Social (escape from tasks/activities)	-.21	-.07	**.15**	-.01	.06
Automatic (sensory stimulation)	.32	-.49	-.51*	**.60***	-.14
Automatic (pain attenuation)	.07	.67**	.25	-.46	**-.13**

Note. Correlation coefficients for functionally analogous scales are in bold.

* $p < .05$, 2-tailed. ** $p < .01$, 2-tailed.

4. What are the relationships of the non-analogous subscales on the FAST, MAS, and QABF for a sample of children and youth with ASD?

In theory, when examining the relationships between non-analogous scales on these instruments, one would expect low to moderate correlations; however, for the current study, this was not the case. Spearman's rank order correlations for non-analogous scales on the MAS and the QABF revealed correlation coefficients ranging from -.04 to .77 ($p < .01$), with 4 out of 16 of these correlation coefficients statistically significant (see Table 10). Three of the four statistically significant correlations between non-analogous scales on the MAS and QABF were related to the MAS attention subscale. As seen in Table 10, correlation coefficients between this scale and the QABF tangible and escape scales demonstrated moderate negative correlations. The strongest correlation between any of the subscales on the MAS and the QABF, including the functionally analogous scales, was that between the MAS attention scale and the QABF non-social scale. For the majority of the participants, the MAS attention subscale received a higher rank than that of the QABF non-social scale. Furthermore, when the MAS attention subscale was ranked higher, the discrepancy between its rank and the rank of QABF non-social subscale was approximately one half to one and a half positions lower. When the reverse was true, and the QABF non-social scale was designated a higher rank, the difference between its rank and that of the MAS attention scale was larger, ranging from one half to two positions. Finally, Table 10 shows that the MAS tangible subscale and the QABF non-social subscale were found to have a moderate negative correlation. In exactly half of the cases, the tangible subscale was assigned the higher rank, and vice versa. Regardless of which scale was ranked higher, the discrepancy between the two ranks was greater than or equal to two in 75% of the participants.

Correlation coefficients for the three non-analogous scales on the MAS and FAST were deemed statistically significant, accounting for 25% of the coefficients for non-analogous scales. Two of the statistically significant correlations related to the MAS

tangible scale, and two related to the FAST automatic (pain attenuation) scale. A moderate negative correlation was found between the FAST automatic (pain attenuation) subscale and the MAS sensory subscales. Based on visual inspection of the rankings (see Table 11), the FAST automatic (pain attenuation) was the lowest ranked scale for 11 of the 16 participants. In contrast, the MAS sensory scale was the highest ranked scale for 9 out of 16 participants. This pattern can account for the significant negative correlation between the FAST automatic (pain attenuation) subscale and the MAS sensory and MAS tangible subscales.

As Table 11 reveals, the strongest correlation was between the FAST automatic (pain attenuation) and MAS tangible subscales. The rankings for these two scales aligned with one another on three occasions; however, there were an additional four occasions when both scales were ranked lowest (although they did not receive equal rankings due to a tie on one of the scales). In cases where the FAST automatic (pain attenuation) scale did not receive the lowest ranking (n = 4), the ranking for the MAS tangible scale was elevated, and received no lower than second rank.

When assessing the relationship between the non-analogous scales on the FAST and the QABF, only 2 of the 15 coefficients were found to be statistically significant (13%) (see Table 12). The strongest correlation among any of the scales on the QABF and the FAST (including functionally analogous scales) was found between the QABF tangible subscale and the FAST automatic (pain attenuation) subscale, revealing a similar pattern to the one described above when making comparisons between the MAS and FAST. Rankings for these subscales aligned for four participants. When these rankings were not equal they often differed by no more than one and a half positions, with the FAST automatic (pain attenuation) scale most frequently ranked lowest. A moderate negative correlation was found between the QABF escape subscale and the FAST automatic (sensory stimulation) subscale.

Again, based on visual inspection of the rankings of the functions for each scale, it was evident that in five cases, when one of these subscales received the top ranking, the other received the lowest ranking for that same participant (see Table 12).

DISCUSSION

This study compared the results of the MAS, FAST and QABF when completed by parent informants, in a sample of children and youth with ASD who display challenging behaviour. The following discussion will (a) review the relevant findings and make comparisons to previous research, (b) provide possible explanations for the discrepancies amongst the questionnaires, (c) note the strengths and limits of the current study and suggest future directions for research, and (d) describe the clinical implications of the current findings.

Summary of Findings

Functions Determined by Each Instrument

The most common primary functions identified by the MAS, QABF and the FAST were, sensory, physical and non-social and social (attention/preferred items), respectively. It is of interest that while the MAS and QABF both often identified automatic sources of reinforcement, the FAST was more likely to identify socially mediated sources of reinforcement. The findings reported by Love, Carr and Leblanc (2009) are consistent with the results obtained from the FAST in the current study. A further comparison can be made to the results of a review of EFA completed by Hanley and colleagues (2003), who also reported that social positive reinforcement was the most commonly cited source of reinforcement (35% of cases), with social negative reinforcement identified as the primary function for 34% of cases. It is important to note that the review conducted by Hanley et al. (2003) included adults and children with and without developmental disabilities, not solely ASD. The finding that a substantial proportion of the behaviours assessed by the FAST in this study were maintained by socially mediated consequences is not surprising. Given the significant impairments in communication and social interaction associated with ASD, it may be that these individuals do not have a more socially appropriate means of

accessing sources of social reinforcement and thus, they rely on problem behaviour to get their needs met (Iwata et al., 1982/1994). Also, as suggested by Iwata and colleagues (1982/1994), it is possible that the settings in which these individuals spend their time, simply do not provide sufficient access to socially mediated reinforcement. With respect to the FAST, it is possible that the social (attention/preferred items) subscale was most frequently ranked as the primary function simply because it combines two commonly endorsed functional categories – social attention and access to tangibles.

The finding that as many as 50% of the target behaviours assessed in this study yielded multiple primary functions is of interest for several reasons. It is widely acknowledged within the literature that challenging behaviour displayed by individuals with developmental disabilities can be multiply determined, however, it may be the case that multiply controlled behaviour would be more typically observed in adults than children. Adults have a longer history of challenging behaviour and may have learned that behaviour is an effective means of obtaining a wide variety of desired consequences in various environments and/or settings (Matson & Boisjoli, 2007). Matson and Boisjoli (2007) reported that as many as 37% of aggressive behaviours and 55% of SIBs were multifunctional when assessed using the QABF in a sample of adults with ID. Furthermore, up to four primary functions were identified for many of the participants (Matson & Boisjoli, 2007). In 2003, Hanley and colleagues reviewed data from EFAs conducted on problem behaviours exhibited by sample of children and adults with and without ID. Findings indicated that 15% of the behaviours were multiply controlled, a proportion substantially lower than what was found in the current study. Nonetheless, a recent study by Love, (2009) found that up to 45% of challenging behaviours displayed by a sample of 32 children with ASD (including PDD-NOS and Asperger's Disorder) were maintained by multiple functions. While the prevalence of multifunctional problem behaviour may seem inflated for a sample consisting of children, the authors instead suggested that this may in fact be characteristic of behaviour seen in individuals with ASD (Love et al., 2009). Love and colleagues (2009) asserted that individuals with ASD

respond to a wide variety of consequences that follow problem behaviour and simply lack the skills to access these consequences in ways that are socially appropriate. The results of the current study are consistent with Love et al (2009).

Multiply Controlled Behaviours

Behaviours that serve multiple functions present significant issues to clinicians responsible for designing behaviour interventions. Treatment of multiply controlled problem behaviour can be quite complex, because interventions aimed at reducing behaviours occurring under one set of conditions and serving one function, may inadvertently reinforce the instance of the behaviour serving a different function, thereby exacerbating the problem (Smith, Iwata, Vollmer & Zarcone, 1993). Interventions aimed at reducing multifunctional behaviours must target functionally equivalent alternative behaviours to replace *each* of the functions the behavior was found to serve. Similarly, the intervention plans must prescribe different responses to the behaviour based on the function it is serving under various stimulus conditions. This means that mediators must be able to easily alter their responses to the target behavior based on the conditions under which the behaviour occurs (Smith et al.,1993). Due to the complex nature of these interventions, it is likely that implementation would require additional time and expertise in the field of ABA.

As mentioned above, it is quite possible that children and youth with ASD, with their limited communication and social skills, and patterns of restricted and repetitive behaviour, might engage in behaviour that serves multiple purposes. However, it is also possible that measurement error is responsible for the high percentage of behaviours appearing to serve multiple functions. According to the authors of the MAS, if three or more functions are elevated for a particular target behaviour, the tool may not have been completed correctly (Durand & Crimmins, 1988). The fact that the measures were administered in questionnaire format, rather than by interview, may have reduced their accuracy. In addition, the current study used parents as informants, whereas the vast majority of studies examining the properties of these tools have relied on direct care staff,

professionals or teachers to complete the questionnaires. Although parents are able to provide a wealth of information regarding their children, it is possible that using them as informants for the completion of FBA questionnaires actually decreases the validity of these tools. The potential challenges associated with having parents complete FBA rating scales will be discussed in more detail in the below.

Comparing Functional Hypotheses Derived from the FAST, MAS and QABF

In order to compare the results produced by the MAS, QABF and FAST, several different methods of analysis were used. First the primary function(s) identified by each of the measures were compared using percentage agreement. This method was selected because primary function is most important when working in applied settings where the purpose of FBA is to guide recommendations leading to intervention (Kwak et al., 2004; Spreat & Connelly, 1996). When the exact method was utilized, scores ranged from 25% agreement to 37.5% agreement. Using a less conservative method to calculate agreement among each of the functions identified by the three tools, agreement was slightly higher, but remained less than satisfactory. The highest level of agreement was found between the MAS and FAST, while the poorest agreement was found between the MAS and QABF.

It is of particular interest that for the three participants where the MAS, FAST and QABF agreed on the primary function of the target behaviour, a sensory function was identified in each case. Wasano et al. (2009) reported 100% concordance between the MAS and the QABF in a sample of three children exhibiting pica. Again, for each participant, the primary function identified was sensory stimulation. The authors hypothesized that the convergence of the results of the MAS and QABF may be in part attributed to the topography of the target behaviour being assessed. Furthermore, it was suggested that behaviours that are known to be more variable in terms of behavioural function may be more difficult to assess using these tools (Wasano et al., 2009).

Relationships between Subscales

Correlations between functionally analogous scales on the MAS, FAST and QABF were substantially lower than anticipated. While it was hypothesized that the correlation coefficients for analogous scales would demonstrate strong, positive relationships, few of these correlations were found to be statistically significant, and some were even found to be negative.

In addition, agreement amongst functionally analogous scales in this study for the MAS and QABF was considerably lower than what has been reported by previous researchers (see Table 13). In comparison, Paclawskyj et al. (2001) who examined the concordance of the MAS and QABF with individuals with ID (n = 31) also reported statistically significant correlations for two of the four analogous scales (tangible and sensory), although the correlations were considered to be stronger than those in the current study and significant at the $p<.001$ level. Using a sample of adults with ID (n = 20), Shogren and Rojahn (2003) reported strong correlations between all four functionally analogous scales, ranging from .73 (escape) to .89 (sensory), all of which were statistically significant at the $p<.001$ level. There are several possible explanations for the discordant results. First, it is possible that the discrepancy is a result of sample characteristics. The two previous studies (Shogren & Rojahn, 2003; Paclawskj et al., 2001) have utilized samples comprised of individuals diagnosed with ID, whereas the current study consisted of individuals who have ASDs, several of whom were not diagnosed with an ID. The aforementioned studies relied on staff informants, whereas the current study used parent informants. As previously mentioned, the accuracy of these tools when completed by parents is unknown. Further, it is possible that the higher rates of agreement reported in previous studies was in part due to the identification of a single maintaining variable, and that agreement is less likely with behaviours that are multiply determined. QABF agreement between raters was lower when the behaviours were maintained by multiple sources of reinforcement (Matson & Boisjoli, 2007).

Table 13

Spearman's Rank Order Correlations For the Subscales of the MAS and the QABF for the present study, Shogren & Rojahn (2003) and Paclawskyj et al. (2001).

	MAS			
QABF	Attention	Tangible	Escape	Sensory
		Current Study[a]		
Attention	**.32**	-.14	-.10	-.30
Tangible	-.51*	**.66****	.37	-.44
Escape	-.54*	.43	**.54***	-.23
Non-Social	.77**	-.71**	-.46	**.48**
Physical	-.32	.16	-.04	.05
		Shogren & Rojahn (2003)[b, c]		
Attention	**.87*****	.53*	.64**	.57**
Tangible	.57**	**.87*****	.63**	.23
Escape	.31	.46*	**.73*****	.47*
Non-Social	.55*	.17	.53*	**.89*****
Physical	.10	-.19	-.06	.47*
		Paclawskyj et al. (2001)[b, c]		
Attention	**.51**	.41	-.28	.25
Tangible	.44	**.86*****	-.19	.54
Escape	-.14	.13	**.51**	.47
Non-Social	.27	.66**	.04	**.79*****
Physical	.34	.82***	.05	.80***

Note. [a] 2-tailed. [b] not specified. [c]rounded to two decimal places.

* $p < .05$. ** $p < .01$. *** $p < .001$.

One would expect to find relatively weak relationships between subscales that are not designed to measure the same variable; however this was not the case. In general, there was a higher proportion of statistically significant correlations amongst non-analogous scales than the analogous scales. This suggests that the non-analogous scales on the MAS, FAST and QABF are related. The correlations found in this study are comparable to Paclawskyj and colleagues (2001) who reported three statistically significant correlations for non-analogous scales. In contrast, Shogren & Rojahn (2003) reported nine out of 16 correlation coefficients (ranging from .46, $p < .05$ to .64, $p < .01$) were significantly significant among non-analogous scales.

Potential Explanations for the Discrepancies among the FAST, MAS and QABF

Administration Issues

The discrepancies in the functional hypotheses derived from these instruments, as well as the lower levels of agreement found in this study in comparison to previous studies may in part be due to issues related to the administration of the instruments. Both the FAST and the QABF are intended to be administered by interview, while the MAS can be used in either interview or questionnaire form. In the current study it was consciously decided that the measures would be administered in questionnaire format because this is how the instruments are often used in applied settings. The fact that the measures were administered in questionnaire format, rather than by interview, may have reduced the amount of clarification parents sought during completion. It is also important to recognize that the MAS, FAST and QABF were not intended to be completed one after another. In the current study, all three instruments were completed in the same session. For parents who identified more than one target behaviour, or who had multiple children participating in the study, this meant that multiple sets of questionnaires were completed in a relatively short period of time. Even though steps were taken to minimize the carry-over effects, parent responses may have varied across measures as they become more familiar with the types of questions being asked, particularly when completing the measures repeatedly for different behaviours, or in one case, children.

The fact that many of the children and youth were in the vicinity during the completion of the questionnaires may have also influenced parent responses. Although a research assistant was present to assist with child care, some parents may have been distracted by their child. In addition, behaviours that occurred during the data collection period may have influenced parents' perceptions of their child's behaviour, and thus their responses.

It is also possible that the operational definitions for the target behaviours were not specific enough, and encompassed several response classes of behaviour, rather than a single response class. Initially, many of the parents who participated in the study identified a chain or cluster of behaviours as target behaviours and had difficulty isolating a single behaviour to target. Furthermore, the MAS asks the rater to specify the "setting" in which the behaviour occurs in order to further reduce the likelihood that that multiple response classes will be identified for assessment. As suggested by Sturmey (1994), the term "setting" may simply be too vague, leading some informants to identify a physical setting (e.g., at home) rather than a specific set of stimulus conditions under which the behaviour occurs (e.g., when asked to do chores). This can be problematic because there can be numerous conditions within any one physical setting that have stimulus control over a behaviour (Sturmey, 1994). As a result the instrument may indicate that the target behaviour is multiply controlled. While the researcher coached parents to select a single discrete behaviour and identify the setting in which the behaviour occurs, the researcher was not familiar with the child's behaviour and therefore had to rely on parents' judgment. The potential limitations associated with having parents complete FBA questionnaires will be discussed in more detail below.

Parents as Informants

As noted above, the impact of using parents as informants on the accuracy of FBA questionnaires is not known; therefore, the possibility that this factor resulted in lower levels of agreement compared to previous studies, cannot be ruled out. To date, no studies have compared the accuracy with which the tools are completed when various

types of informants are used (e.g., mothers, fathers, teachers, therapists). Furthermore, the discrepancy may be accounted for in the amount of behavioural training received by staff compared to parents. Unfortunately, there was no measure of parent's prior knowledge or behavioural training in this study. In some cases, previous studies have used trained staff as informants (e.g., Durand & Crimmins, 1988), or provided behavioural training to informants prior to the completion of the questionnaires (Zarcone et al., 1991). At present, little is known about the prerequisite skills needed for accurate completion of these instruments. Individuals with ASD often display a large repertoire of behaviour, which can occur in clusters or sequences, blurring the line between one discrete behaviour and another (Alter, Conroy, Mancil, & Haydon, 2008). This may make it increasingly difficult for those who have not been trained in behavioural observation and assessment to write a precise operational definition for a given behaviour, and to isolate the contexts in which the behaviours are likely to occur (Alter et al., 2008). From a clinical perspective, this finding is important as many behaviour analysts use parent reports on these measures as a primary means of determining the function of behaviour. This study suggests that the validity of these measures may be further compromised when parents are the informants.

Inherent Differences in the Questionnaires

When explaining the discrepancy in the results derived from the FAST, MAS and QABF, it is also important to closely examine the inherent differences in the questionnaires themselves. Perhaps the most obvious difference between the questionnaires is that each uses slightly different functional categories. As discussed in the earlier sections of this paper, the FAST combines two commonly used functional categories – attention and access to preferred items.

While both the FAST and the QABF include subscales designed to measure the role of physical discomfort as a potential source of reinforcement, this functional category is not represented within the MAS. Therefore, in cases where alleviation of physical discomfort is the primary function, the absence of a subscale to address this function on the MAS

may alter the order in which other functions are ranked by allowing a potentially less relevant function to appear to be primary, thus impacting agreement between measures.

Furthermore, there is clearly disparity between the individual items within some of the subscales. The most pronounced differences can be observed within the FAST automatic (pain attenuation) and QABF physical subscales. For instance, the items within the QABF physical subscale are more general in nature (e.g., "Engages in the behavior more frequently when he/she is ill.") as opposed to items on the FAST automatic (pain attenuation) subscale which also inquire about specific conditions that may be associated with pain (e.g., "Does the person have recurring painful conditions such as ear infections or allergies?"). It is also important to note that while the FAST does ask about these conditions, it does not seek to relate these conditions to increased rates of behaviour. A further point of interest is that the FAST automatic (pain attenuation) subscale includes an item regarding cyclical patterns of behavior. Previous research has linked cyclical behavior and the presence of psychiatric illness (e.g., Emerson, Moss & Kierrian, 1999), a topic not broached by the QABF physical subscale. While these two subscales may have intended to tap into the same source of reinforcement, it is possible that they are in fact measuring different types of automatic reinforcement.

In addition, the order in which individual items are presented may influence responses. More specifically, the MAS and QABF rotate items from each of the subscales to ensure that no two items from the same subscale are placed back to back. Alternatively, the FAST is structured in such a way that all items from a particular subscale are grouped together, with one right after the other. It is possible that presenting all of the items within a subscale consecutively may result in carryover or it is equally possible that mixing up the items results in less opportunity for the informant to focus on a potential function.

Limitations and Future Directions

There are several limitations associated with this study. First, due to the small sample size, the generality of these results is not known. Additionally, it is important to note that one parent completed 4 of the 16 sets of questionnaires (25%) which may have influenced the results, although no patterns were apparent based on visual inspection.

In order to calculate Spearman's Rank Order Correlations between each of the subscales on all three measures, a large number of correlational analyses were conducted. We had hoped to have 18 participants which would have yielded adequate power for this type of analysis; however we decided to proceed with 16 given the recruitment challenges we were faced with. This could subject our results to the potential for type 1 error, however correcting for the number of tests would have inflated the risk of type two error. Given the exploratory nature of this study, however, we felt that a report of potential relationships for further investigation was warranted, the risk of overlooking an effect would be more detrimental than finding an erroneous effect at this stage of exploratory research. It is also possible that the restricted range of data is impacted on the findings and that a larger sample size would have allowed for a wider range of responses and potentially altered the identified relationships. Similarly, it is conceivable that a non-linear relationship between was undetected due to the limited number of participants and restricted range of responses.

Second, the large number of ties in the rankings presented several challenges in the interpretation of the results. This made it impossible to use the adjacent method of calculating agreements, which is often used in the literature. The high number of ties would have artificially inflated the results. Future studies may wish to consider alternative methods of data analysis, particularly if the data reveal that a substantial portion of the behaviours are multi-functional.

Additionally, it is important to acknowledge that the current study did not conduct an EFA nor did it implement intervention based on the results of the questionnaires, in order to confirm the validity of the functional hypotheses derived from the tools.

Therefore, while the study clearly demonstrated the lack of agreement between the three instruments, we did not attempt to determine which of these tools is most accurate. Future research should focus on determining whether or not interventions based on these results are effective in attempts to validate the instruments, specifically, when assessing the function of behaviours displayed by individuals with ASD. Also, additional studies comparing the results of these tools to more established methods of FBA (e.g., experimental functional analysis) using larger sample sizes may be of interest when examining the utility of these instruments to determine which is most accurate and useful.

Finally, additional research focusing on the use of FBA questionnaires with parent informants is clearly needed; including studies which compare the results obtained by parent informants to those obtained from staff and professionals. Researchers should also compare the results of the instruments completed in both questionnaire and interview format. Future studies should explore the influence of behavioural training on the accuracy of the results of these tools within this population in order to determine the clinical utility of these tools in applied settings.

Conclusions

This study offers valuable information with regards to the clinical utility of FBA questionnaires. As noted by Horner (1994), the balance of "precision and efficiency" is essential when selecting appropriate methods of FBA in clinical settings (pp. 402). Although FBA questionnaires were designed to be time efficient, making them ideal for use in applied settings, this strength must be carefully weighed against the limitations associated with the tools, most importantly, their psychometric weaknesses. Even if used in conjunction with more robust methods of FBA, the results of these tools may lead to confusion if the various methodologies do not agree on the functional hypothesis of a target behaviour. Clinicians may encounter significant difficulties in designing effective intervention if the results yield the wrong or multiple functions. Furthermore, for many parents, the implementation of an intervention plan to address a single function may be challenging enough (Allen & Warzak, 2000). If in fact these tools falsely identify multiple

sources of reinforcement for a given target behaviour, more complex interventions may be developed and implemented unnecessarily. In other words, while these indirect measures may appear be time efficient during the assessment period, interventions based on these instruments may require additional time effort and training for the parent.

Until more information about the accuracy and validity of FBA questionnaires is available, clinicians should exercise caution when using these instruments with parents of children and youth with ASD as a means of determining behavioural function. At best, they may provide information on the parent's perception of function (Feldman & Griffiths, 1997). Still, the lack of correspondence between instruments using the same parent as informant, suggests that the parent's perception may change based on how questions about function are presented. At this time, these questionnaires should not be used as the sole means of ascertaining function and designing functionally-derived treatment (Feldman & Griffiths, 1997). Clinicians who wish to utilize these tools to supplement other methods of FBA within a bio-psycho-social assessment, should consider their value on a case-by- case basis (Sturmey, 1994).

References

Ahearn, W. H., Clark, K.M., MacDonald, R.P.F. & Chung, B.I. (2007). Assessing and treating vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis,* 40, 263-275.

Allen, K. D. & Warzak, W. J. (2000). The problem of nonadherence in clinical behavior analysis: Effective treatment is not enough. *Journal of Applied Behavior Analysis,* 33, 373-391.

Alter, P. J., Conroy, M. A., Mancil, G. R. & Haydon, T. (2008). A comparison of functional behavior assessment methodologies with young children: Descriptive methods and functional analysis. *Journal of Behavioral Education, 17*, 200-219.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental , (4th ed.), Text Revision.* Washington, DC: Author.

Andorfer, R. E. & Miltenberger, R. G. (1994). Home-based descriptive and experimental analysis of problem behaviours in children. *Top Early Childhood Special Education, 14,* 64-87.

Applegate, H., Matson, J. L., & Cherry, K. E. (1999). An evaluation of functional variables affecting severe problem behavior using the Questions About Behavior Scale. *Research in Developmental Disabilities, 20*, 229-237.

Baer, D. M., Wolf, M. M., & Risely, T. R. (1987). Some still-current dimensions of applied behaviour analysis. *Journal of Applied Behavior Analysis, 20*, 313-327.

Baer, D. M., Wolf, M. M., & Risely, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*, 91-97.

Barrera, F. J. & Graver, E. E. (2009). A comparison of behaviour functions in community facility settings. *Journal on Developmental Disabilities, 15*, 30-34.

Bijou, S., Peterson, R., & Ault, M. (1968). A method to integrate descriptive and field studies at the level of data and empirical concepts. *Journal of Applied Behavior Analysis, 1*, 175-191.

Bondy, A. S. & Frost, L. A. (1994). PECS: The picture exchange communication system training manual. Cherry Hill, NJ: Pyramid educational consultants, PECS Inc.

Bonvillian, J. D., Nelson, K. E., & Milnes Rhyne, J. (1981). Sign language and autism. *Journal of Autism and Developmental Disorders, 11*, 125-137.

Bradley, E. A., Summers, J. A., Wood, H.L. & Bryson, S. E. (2004). Comparing rates of psychiatric and behaviour disorders in adolescents and young adults with severe intellectual disability with and without autism. *Journal of Autism and Developmental Disorders, 34*, 151-161.

Bruininks, R., Woodcock, R., Weatherman, R. & Hill, H. (1996). *Scales of Independent Behavior – Revised: A Comprehensive Manual.* Chicago, IL: Riverside Publishing Company.

Campbell, J. M. (2003). Efficacy of behavioral interventions for reducing problem behaviour in persons with autism. A quantitative synthesis of single-subject

Carr, E. G. (1977). The motivation of self-injurious behaviour: A review of some hypotheses. *Psychological Bulletin, 84*, 800-816.

Carr, E. G. (1994). Emerging themes in the functional analysis of problem behavior. *Journal of Applied Behavior Analysis, 27*, 393-399.

Carr, E. G. & Durand, V. M. (1985). Reducing behaviour problems through functional communication training. *Journal of Applied Behaviour Analysis, 18*, 111-126.

Carr, J. E. & Sidener, T. M. (2002). On the relation between applied behaviour analysis and positive behaviour support. *The Behavior Analyst, 25*, 245-253.

Coghill, D. (2003). Current issues in child and adolescent psychopharmacology. Part 2: Anxiety and obsessive-compulsive disorders, autism, Tourette's and schizophrenia. *Advances in Psychiatric Treatment, 9*, 289-299.

Cooper, J. O., Heron, T. E., & Heward , W. L. (2007). *Applied behaviour analysis* (2nd ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Crawford, J., Brockel, B., Schauss, S., & Miltenberger, R. G (1992). A comparison of methods for the functional assessment of stereotypic behavior. *Journal of the Association for Persons with Severe Handicaps, 17*, 77-86.

Cunningham, E., & O'Neill, R. H. (2000). Comparison of results of functional assessment and analysis methods with young children with autism. *Education and Training in MentalRetardation and Developmental Disabilities, 35*, 406-414.

Derby, K. M., Wacker, D. P., Sasso, G., Steege, M., Northup, J., Cigrand, K., & Asmus, J. (1992). Brief functional assessment techniques to evaluate aberrant behaviour in an outpatient setting: A summary of 79 cases. *Journal of Applied Behavior Analysis, 25*, 713-721.

Didden, R., Duker, P. C., & Korzilius, H. (1997). Meta-analytic study on treatment effectiveness for problem behaviors with individuals who have mental retardation. *American Journal on Mental Retardation, 101*, 387-399.

Dorsey, M. F., Iwata, B. A., Reid, D. H., & Davis, P. A. (1982). Protective equipment: Continuous and contingent application in the treatment of self-injurious behaviour. *Journal of Applied Behavior Analysis, 15*, 217-230.

Duker, P. C., & Sigafoos, J. (1998). The Motivation Assessment Scale: Reliability and construct validity across three topographies of behavior. *Research in Developmental Disabilities,19*, 131-141.

Durand, V. M., & Crimmins, D. B. (1988). Identifying the variables maintaining self-injurious behavior. *Journal of Autism and Developmental Disorders, 18*, 99-117.

Ellingson, S. A., Miltenberger, R. G., & Long, E. S. (1999). A survey of the use of functional assessment procedures in agencies serving individuals with developmental disabilities. *Behavioral Interventions, 14*, 187-198.

Emerson, E. (2000). *Challenging behaviour: Analysis and intervention in people with intellectual disabilities* (2nd ed.). Cambridge, England: Cambridge University Press.

Emerson, E., Moss, S. & Kiernan, C. (1999). The relationship between challenging behaviour and psychiatric disorders in people with severe developmental disabilities. In N. Bouras (Ed.), *Psychiatric and behavioural disorders in developmental disabilities and mental retardation* (pp. 38-48). Cambridge: Cambridge University Press.

Emerson, E., Robertson, J., Gregory, N., Hatton, C., Kessissoglou, S., Hallam, A., & Hillery, J. (2000). Treatment and management of challenging behaviours in residential settings. *Journal of Applied Research in Intellectual Disabilities, 13,* 197-215.

Feldman. M.A., Atkinson, L., Foti-Gervais, L., & Condillac, R. (2004). Formal versus informal interventions for challenging behaviour in persons with intellectual disabilities. *Journal of Intellectual Disabilities Research, 48,* 60-68.

Feldman, M. A., Condillac, R. A., Tough, S., Hunt, S., & Griffiths, D. (2002). Effectiveness of community positive behavioural intervention for persons with developmental disabilities and severe behaviour disorders. *Behavior Therapy, 33,* 377-398.

Feldman, M.A., & Griffiths, D. (1997). Comprehensive assessment of severe behavior disorders. In N.N. Singh (Ed.), *Treatment of severe behavior problems: Models and methods in developmental disabilities.* (pp. 23-48). Pacific Grove, CA: Brooks/Cole.

Fisher, W. W., Adelinis, J. D., Thompson, R. H., Worsdell, A. S., & Zarcone, J. R. (1998). Functional analysis and treatment of destructive behavior maintained by termination of "don't" (and symmetrical "do") requests. *Journal of Applied Behavior Analysis,* 31, 339-356.

Floyd, R. G., Phaneuf, R .L., & Wilczynski, S. M.. (2005). Measurement properties of indirect assessment methods for functional behavioral assessment: A review of research. *School Psychology Review, 4,* 58-73.

Freeman, K. A., Walker, M., & Kaufman, J. (2007). Psychometric properties of the Questions About Behavior Function Scale in a child sample. *American Journal on Mental Retardation, 2*, 122-129.

Gardner, W. I. (1998). Initiating the case formulation process. In D. M. Griffiths, W. I. Gardner, & J. A. Nugent (Eds.), *Behavioural supports: Individual centered interventions* (pp. 17-65). Kingston, NY: NADD Press.

Gillberg, C. (2007). The autism spectrum. J. W. Jacobson, J. A. Mullick & J. Rojahn (Eds.), *Handbook of intellectual and developmental disabilities* (pp. **-**), NY: Springer.

Hagopian, L. P., Bruzek, J. L., Bowman, L. G., & Jennett, H. K. (2007). Assessment and treatment of problem behavior occasioned by interruption of free-operant behavior. *Journal of Applied Behavior Analysis, 40,* 89-103.

Hall, S. S. (2005). Comparing descriptive, experimental and informant-based assessment of problem behaviors. *Research in Developmental Disabilities, 26*, 514-526.

Hanley, G. P., Iwata, B. A., & McCord, B. E. (2003). Functional analysis of problem behavior: A review. *Journal of Applied Behavior Analysis, 36*, 147-185.

Herzinger, C. V., & Campbell, J. M. (2007). Comparing functional assessment methodologies: A quantitative synthesis. *Journal of Autism and Developmental Disorders, 37*, 1430-1445.

Horner, R. H. (1994). Functional assessment: Contributions and future directions. *Journal of Applied Behavior Analysis, 27*, 401-404.

Iwata B. A. & DeLeon, I. (1996). The functional analysis screening tool. Gainesville, FL: The Florida Centre of Self-Injury, University of Florida.

Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27*, 197-209. (Reprinted from *Analysis and Intervention in Developmental Disabilities, 2*, 3-20, 1982).

Johnston, J. M., Foxx, R. M., Jacobson, J. W., Green, G., & Mulick, J. A. (2006). Positive behaviour support and applied behaviour analysis. The Behavior Analyst, 29, 51-74.

Joosten, A. V. & Bundy, A. C. (2008). The motivation of stereotypic and repetitive behaviour: Examination of construct validity of the Motivation Assessment Scale. *Journal of Autism and Developmental Disorders, 38,* 1141-1348.

Kahng, S. W. & Iwata, B. A. (1999). Correspondence between outcomes of brief and extended functional analyses. *Journal of Applied Behavior Analysis, 32,* 149-159.

Kahng, S. W., Iwata, B. A., Fischer, S. M., Page, T. J., Treadwell, K. R. H., Williams, D.E., & Smith, R. G. (1998). Temporal distributions of problem behaviour based on scatter plot analysis. *Journal of Applied Behavior Analysis, 31*, 593-604.

Lavigna, G. & Donnellan, A. (1987) *Alternatives to punishment: Solving behaviour problems with non-aversive strategies.* NY: Irvington Publishers.

Lecavalier, L. (2006). Behavioural and emotional problems in young people with pervasive developmental disorders: Relative prevalence, effects of subject characteristics, and empirical classification. *Journal of Autism and Developmental Disorders, 36*, 1101-1114.

Lennox, D. B., & Miltenberger, R. G. (1989). Conducting a functional assessment of problem behavior in applied settings. *Journal of the Association for Persons with Severe Handicaps, 14*, 304-311.

Lewis, T. J., Scott, T. M., & Sugai, G. M. (1994). The problem behaviour questionnaire: A teacher-based instrument to develop functional hypotheses of problem behaviour in general education classrooms. *Diagnostique, 19*, 103-115.

Lovaas, O. I., Newsom, C. & Hickman, C. (1987). Self-stimulatory behaviour and perceptual reinforcement. *Journal of Applied Behavior Analysis, 20*, 45-68.

Lovaas, O. I. & Schreibman, L. (1971). Stimulus overselectivity of autistic children in a two stimulus situation. *Behaviour Research and Therapy, 9*, 305-310.

Love, J. R., Carr, J. E. & LeBlanc, L. A. (2009). Functional assessment of problem behaviour in children with autism spectrum disorders: A summary of 32 outpatient cases. *Journal of Autism and Developmental Disorders, 39*, 363-372.

Lyons, E. A., Rue, H. C., Luiselli, J. K., & DiGennaro, F. D. (2007). Brief functional analysis and supplemental feeding for postmeal rumination in children with developmental disabilities. *Journal of Applied Behavior Analysis, 40*, 743-747.

Mandell, D. S. (2008). Psychiatric hospitalization among children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 38,* 1059-1065.

Matson, J. L., Bamburg, J. W., Cherry, K. E., & Paclawskyj, T. R. (1999). A validity study on the Questions About Behavior Function Scale: Predicting treatment success for self-injury, aggression and stereotypies. *Research in Developmental Disabilities, 20*, 163-176.

Matson, J. L. & Boisjoli, J. A. (2007). Multiple versus single maintaining factors of challenging behaviours as assessed by the QABF for adults with intellectual disabilities. *Journal of Intellectual Disability, 32*, 39-44.

Matson, J. L. & Dempsey, T. (2008). Autism spectrum disorders: Pharmacotherapy for challenging behaviors. *Journal of Developmental and Physical Disability, 20*, 175-191.

Matson, J. L., Kuhn, D. E., Dixon, D. R., Mayville, S. B., Laud, R. B., Cooper, C. L., Malone, C. J., Minshawi, N. F., Singh, A. N., Luke, M. A., Lott, J. D., & Matson, M. L. (2003). The development and factor structure of the Functional Assessment for multiple causality (FACT). *Research in Developmental Disabilities, 24*, 485-495.

Matson, J. L., & Minshawi, N.F. (2007). Functional assessment of challenging behavior: Toward a strategy for applied settings. *Research in Developmental Disabilities, 28*, 353-361.

Matson, J. L., & Vollmer, T. R. (1995). *User's guide: Questions About Behavioral Function (QABF)*. Baton Rouge, LA: Scientific Publishers, Inc.

McClintock, K., Hall, S., & Oliver, C. (2003). Risk markers associated with challenging behaviours in people with intellectual disabilities: A meta-analytic study. *Journal of Intellectual Disability Research, 47*, 405-416.

Miltenberger, R. G. (2004). *Behavior modification: Principles and procedures (3rd ed.).* Belmont, CA: Wadsworth/Thompson Learning.

National Institutes of Health [NIH]. (1991). *Treatment of destructive behaviours in persons with developmental disabilities.* Consensus Development Conference. September 11-13, 1989, Bethesda, MD: Author.

Neef, N. A. & Peterson, S. M. (2007). Functional behaviour assessment. In J. O. Cooper, T. E. Heron & W. L. Heward (Eds.), *Applied behaviour analysis* (2nd ed.) (pp. 500-524). Upper Saddle River, NJ: Pearson Prentice Hall.

Newcomer, L. L. & Lewis, T, J. (2004). Functional Behavioral Assessment: An investigation of assessment reliability and effectiveness of function-based interventions. *Journal of Emotional and Behavioral Disorders, 12,* 168-181.

Nicholson, J., Konstantinidi, E., & Furniss, F. (2006). On some psychometric properties of the Questions About Behavior Function (QABF) Scale. *Research in Developmental Disabilities, 27*, 337-352.

Northup, J., Wacker, D., Sasso, G., Steege, M., Cigrand, K., Cook,J., & DeRaad, A. (1991). A brief functional analysis of aggressive and alternative behaviour in an outpatient clinic. *Journal of Applied Behavior Analysis, 24*, 509-522.

O'Neill, R. E., Horner, R. H., Albin, R. W., Storey, K., Sprague, J. R. (1990). *Functional analysis of problem behaviour: A practical assessment guide.* Sycamore, IL: Sycamore Press.

Paclawskyj, T. R., Kurtz, P. F., & O'Connor, J. T. (2004). Functional assessment of problem behaviors in adults with mental retardation. *Behavior Modification, 28*, 649-667.

Paclawskyj, T. R., Matson, J. L., Rush, K. S., Smalls, Y., & Vollmer, T. R. (2000). Questions About Behavioral Function (QABF): A behavioral checklist for functional assessment of aberrant behavior. *Research in Developmental Disabilities, 21*, 223-229.

Paclawskyj, T. R., Matson, J. L., Rush, K. S., Smalls, Y., & Vollmer, T. R. (2001). Assessment of the convergent validity of the Questions About Behavior Function Scale with analogue functional analysis and the motivation assessment scale. *Journal of Intellectual Disability Research, 45*, 484-494.

Perry, A., & Black, A. (2003). Autism. In I. Brown & M. Percy (Eds.), *Developmental disabilities in Ontario (2nd)* (pp. 205-216). Toronto: Ontario Association on Developmental Disabilities.

Piazza, C. C., Roane, H. S., Keeney, K. M., Boney, B. R., & Abt, K. A. (2002). Varying response effort in the treatment of pica maintained by automatic reinforcement. *Journal of Applied Behavior Analysis,* 35, 233-246.

Prizant, B. M. (1983). Language and communicative behavior in autism. Journal of *Speech and Hearing Disorders, 48*, 296-307.

Rapp, J. T., & Vollmer, T. R. (2005). Stereotypy I: A review of behavioural assessment and treatment. *Research in Developmental Disabilities, 26,* 527-547.

Rice, C. (2009). Prevalence of autism spectrum disorders -- Autism and Developmental Disabilities Monitoring Network, United States, 2006. *CDC Morbidity and Mortality Weekly Report (MMWR) Surveillance Summaries. December 18, 2009 / 58(SS10)*; 1-20.

Roane, S. H. (2008, May). *Assessment and treatment of idiosyncratic response relations in children with autism spectrum disorder.* Presented at ABA International Annual Conference.

Schopler, E. C., Reichler, R., & Renner, B. (1988). *The Childhood Autism Rating Scale (CARS).* Los Angelos, CA: Western Psychological Services.

Scotti, J. R., Evans, I. M., Meyer, L. H., & Walker, P. (1991). A meta-analysis of intervention research with problem behaviour: Treatment validity and standards of practice. *American Journal on Mental Retardation, 96,* 233-256.

Sherrard, Tonge & Ozanne-Smith, (2002). Injury risk in young people with intellectual disability. *Journal of Intellectual Disability Research, 46*, 6-16.

Shogren, K. A., & Rojahn, J. (2003). Convergent reliability and validity of the Questions About Behavioral Function and the Motivation Assessment Scale: A replication study. *Journal of Developmental and Physical Disabilities, 15*, 367-375.

Sigafoos, J., Arthur, M., & O'Reilly, M. F. (2003*). Challenging behaviour and developmental disability*. London: Whurr Publishers.

Sigafoos, J. Kerr, M., & Roberts, D. (1994). Interrater reliability of the Motivation Assessment Scale: Failure to replicate with aggressive behavior. *Research in Developmental Disabilities, 15,* 333-342.

Singh, A. N., Matson, J. L., Mouttapa, M., Pella, R. D., Hill, B. D., & Thorson, R. (2009). A critical item analysis of the QABF: Development of a short form assessment instrument. *Research in Developmental Disabilities, 30*, 782-792.

Skinner, B. F. (1974). *About behaviourism.* NY: Random House, Inc.

Smith, R. G., Iwata, B. A., Vollmer, T. R. & Zarcone, J. R. (1993). Experimental analysis and treatment of multiply controlled self-injury. *Journal of Applied Behavior Analysis, 26*, 183-196.

Sprague, J. R. & Horner, R. H. Functional assessment and intervention in community settings. *Mental Retardation and Developmental Disabilities Research Reviews, 1*, 89-93.

Sturmey, P. (1995). Analog baselines: A critical review of methodology. *Research in Developmental Disabilities, 16*, 269-284.

Thompson, R. H., & Iwata, B. A. (2007). A comparison of outcomes from descriptive and functional analyses of problem behavior. *Journal of Applied Behavior Analysis, 40*, 333-338.

Touchette, P. E., MacDonald, R. F., & Langer, S. N. (1985). A scatter plot for identifying stimulus control of problem behavior. *Journal of Applied Behavior Analysis, 18*, 343-351.

Tsakanikos, E., Costello, H., Holt, G., Sturmey, P., & Bouras, N. (2007). Behaviour management problems as predictors of psychotropic medication and use of psychiatric services in adults with autism. *Journal of Autism and Developmental Disorders, 37*, 1080-1085.

Wasano, L. C., Borrero, J. C. & Kohn, C. S. (2009). Brief report: A comparison of indirect versus experimental strategies for the assessment of pica. *Journal of Autism and Developmental Disorders, 39*, 1582-1586.

Wing, L., Gould, J. (1979). Severe impairments of social interaction and associated abnormalities in children: epidemiology and classification. *Journal of Autism and Developmental Disorders, 9*, 11-29.

Yarbrough, S. C., & Carr, E. G. (2000). Some relationships between informant assessment and functional analysis of problem behavior. *American Journal on Mental Retardation, 105*, 130-151.

Zarcone, J. R., Rogers, T. A., Iwata, B. A., Rourke, D. A., & Dorsey, M. F. (1991). Reliability analysis of the Motivation Assessment Scale: A failure to replicate. *Research in Developmental Disabilities, 12*, 349-360.

Appendix A: Letter of Invitation and Consent– Behaviour Consultant

[date]

Title of Study:	Functional Behaviour Assessment of Challenging Behaviour in Children and Youth with ASD Using Parent Report Questionnaires
Principal Investigator/ Faculty Supervisor:	Dr. Rosemary A. Condillac, C. Psych., Assistant Professor
Student Principal Investigator:	Lisa Maire, Graduate Student

Introduction

We invite you to participate in a research project entitled: **Functional Behaviour Assessment of Challenging Behaviour in Children and Youth with ASD Using Parent Report Questionnaires.** Before you agree to participate in this research study, it is important that you read and understand the following explanation of the study. It describes the purpose, procedures, benefits, and risks associated with the study. All research is voluntary. You are free to withdraw at any time without penalty. If you have questions after you read through this form, feel free to contact the Researchers listed above. You should not sign this form until you are sure you understand everything on it.

Purpose of the Research

The purpose of this research project is to compare the results derived from three functional behaviour assessment (FBA) questionnaires that are commonly used to identify the function of challenging behaviour. In addition, the results of these questionnaires will be compared with the results of the various methods used by behaviour consultants throughout their own, independent FBA.

Description of the Research

If you agree to participate in this study, you will be asked to identify clients between the ages of 6 and 18 years who have an ASD and exhibit challenging behaviour. In addition, these clients must be on your current caseload and in the assessment phase. Identified families will be sent a letter inviting them to participate in the study. In addition, you will be asked to complete a demographics questionnaire as well as a brief questionnaire describing the details of the functional behaviour assessment you are conducting for individual clients. It is anticipated that participation in this project will take approximately 1 hour of your time.

Potential Harms (Injury, Discomforts or Inconvenience):

If a question makes you feel uncomfortable, ask to skip it. There is potential risk if the confidentiality of the information we collect were to be lost. To protect confidentiality, information will be kept on a coded form that does not have names or other identifying information. We will keep the names of staff and participants and other identifying information (such as date of birth) on a separate form. All information we collect will be kept in a secure research office, and only authorized research staff will have access to the information.

Potential Benefits:

This research is expected to benefit the lives of individuals with autism and their families in several ways. First off, the results of all three of questionnaires will be made available to you and may provide insight into the caregiver's perceived function of the challenging behaviour(s). In addition, it is believed that the results obtained from this study will contribute to what is currently known about the utility of these questionnaires, and result in improved behaviour assessment methods. Better assessment will likely yield better interventions, and in turn, reduce challenging behaviours.

Confidentiality and Privacy:

Confidentiality will be respected and no information that discloses your identity will be released or published without consent, unless required by law. All information that identifies you or the individual will be kept confidential and stored and locked in our lab at Brock University. Only selected study personnel will have access to this information. In addition, data that will not include identifying information will be stored on a

password protected hard drive located in Dr. Condillac's lab at the Centre for Applied Disability Studies and a duplicate drive will be kept at her Toronto office. It is important to understand that despite these protections being in place, experience in similar studies indicates that there is the risk of unintentional release of information. The principal investigators will protect your records and keep all the information in your study file confidential to the greatest extent possible. The chance that this information will accidentally be given to someone else is quite small.

Publication of Results:
In the event that the results of this study are published or presented at conferences, seminars or other public forums, no individual information or identifying information will be released. We will supply a summary of the results of our study after it is over if you tell us you want one. The results will be published by the Investigators of this research.

Secondary use of data:
As members of the academic community, the researchers may, from time to time, ask the Research Ethics Board at Brock University for permission to use the information collected in this study, as part of other research studies, including research carried out by students under the close supervision of the Principle Investigator of this research.

Reimbursement:
You will not be paid for participating in this study.

Participation and Withdrawal:
Participation in research is voluntary. If you choose not to participate, you will not be affected in any way. Your decision to participate or not participate in this research study will have no effect on you or your agency. If you would like to withdraw from the study, you can do so at any time by contacting us by phone.

Study Contact Information:
If you have any questions about this research study, you may contact Dr. Rosemary A. Condillac, C.Psych, Principal Investigator/Faculty Supervisor (905-688-5550 ext. 5671, e-mail: rcondillac@brocku.ca) (collect calls accepted) or Lisa Maire, Graduate Student/ Student Principal Investigator(e-mail lisa.maire@brocku.ca).

Research Ethics Board Contact:
The Research Ethics Board at Brock University may need to review records for monitoring purposes. As part of this review, someone may contact you from the Research Ethics Board to discuss your experience in the research study. This study has been reviewed and approved by the Brock Research Ethics Board. (File #) If you have questions or concerns about this study you may call the investigators listed above or the Brock University Research Ethics Officer in the Office of Research Services at 905-688-5550 ext. 3035, email: reb@brocku.ca.

Thank you,

Lisa Maire, B. A. Hons.
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Principal Investigator/Faculty Supervisor
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This study has been reviewed and received ethics clearance through Brock University's Research Ethics Board (file # XXX]

Consent to Participate in a Research Study:

Name of Participant: _____ **Agency:** _____

Consent:

- I acknowledge that the research study described above has been explained to me and that any questions that I have asked have been answered to my satisfaction.
- I have been informed of my right to choose that I not participate in the study.
- As well, the potential risks, harms and discomforts have been explained to me and I understand the benefits of participating in the research study.
- I understand that my legal rights have not been waived, nor have I released the investigators, sponsors, or involved institutions from their legal and professional duties.
- I know that I may ask now or in the future any questions I have about the study or the research procedures.
- I have been assured that information collected in the study will be kept confidential and that information will not be released or printed that would disclose the personal identity of participants without permission, unless required by law.
- I understand that the data collected in this study may be used from time to time to address future research questions under the supervision of the Investigators of this research and that privacy and confidentiality will be protected in such situations.
- I have been given sufficient time to read and understand the above information.

By signing this consent, I agree to participate in this study. I will be given a signed copy of this consent form.

X_____ _____

Signature of Participant Name (printed)

_____

Date

By initialing here _____ I agree for the researchers to contact me in the future to participate in other research projects.

X_____ _____

Signature of Investigator Name (printed)

_____

Date

Appendix B: Letter of Invitation and Consent– Caregiver

[date]

Title of Study:	Functional Behaviour Assessment of Challenging Behaviour in Children and Youth with ASD Using Parent Report Questionnaires
Principal Investigator/ Faculty Supervisor:	Dr. Rosemary A. Condillac, C. Psych., Assistant Professor
Student Principal Investigator:	Lisa Maire, Graduate Student

Introduction

We invite you to participate in a research project entitled: **Functional Behaviour Assessment of Challenging Behaviour in Children and Youth with ASD Using Parent Report Questionnaires.** Before you agree to participate in this research study, it is important that you read and understand the following explanation of the study. It describes the purpose, procedures, benefits, and risks associated with the study. All research is voluntary. You are free to withdraw at any time without penalty. If you have questions after you read through this form, feel free to contact the Researchers listed above. You should not sign this form until you are sure you understand everything on it.

Purpose of the Research

The purpose of this research project is to compare three questionnaires that are commonly used to determine the possible reasons why a particular challenging behaviour (e.g., aggression, self-injury) occurs. In addition, the results of these questionnaires will be compared with the results of the assessment completed by your behaviour consultant to see how useful they are.

Description of the Research

If you agree to participate in this study, the student investigator or one of the research assistants will schedule an appointment to come to your home at your convenience. At this appointment, you will be asked to complete some questionnaires about your child's behaviour. During this time, the student investigator/research assistant will observe your child. It is anticipated that in total, the visit will take approximately 2 hours of your time.

Potential Harms (Injury, Discomforts or Inconvenience):

If a question makes you feel uncomfortable, ask to skip it. There is potential risk if the confidentiality of the information we collect were to be lost. To protect confidentiality, information will be kept on a coded form that does not have names or other identifying information. We will keep the names of staff and participants and other identifying information (such as date of birth) on a separate form. All information we collect will be kept in a secure research office, and only authorized research staff will have access to the information.

Potential Benefits:

This research is expected to benefit the lives of individuals with ASD and their families in several ways. First off, the results of the behaviour assessment questionnaires will be communicated to your behaviour consultant following the completion of the study. This information may contribute to the behaviour assessment being completed by the behaviour consultant to determine why your child is engaging in challenging behaviour. In addition, it is believed that the results obtained from this study will contribute to what is currently known about the utility of these questionnaires, and result in improved behaviour assessment methods. Better assessment will likely yield better interventions, and in turn, reduce challenging behaviours.

Confidentiality and Privacy:

Confidentiality will be respected and no information that discloses your identity will be released or published without consent, unless required by law. All information that identifies you or the individual will be kept confidential and stored and locked in our lab at Brock University. Only selected study personnel will have access to this information. In addition, data that will not include identifying information will be stored on a

password protected hard drive located in Dr. Condillac's lab at the Centre for Applied Disability Studies and a duplicate drive will be located at her Toronto office. It is important to understand that despite these protections being in place, experience in similarstudies indicates that there is the risk of unintentional release of information. The principal investigators will protect your records and keep all the information in your study file confidential to the greatest extent possible. The chance that this information will accidentally be given to someone else is quite small.

Publication of Results:
In the event that the results of this study are published or presented at conferences, seminars or other public forums, no individual information or identifying information will be released. We will supply a summary of the results of our study after it is over if you tell us you want one. The results will be published by the Investigators of this research.

Secondary use of data:
As members of the academic community, the researchers may, from time to time, ask the Research Ethics Board at Brock University for permission to use the information collected in this study, as part of other research studies, including research carried out by students under the close supervision of the Principle Investigator of this research.

Reimbursement:
Upon the completion of the visit, you will be given $50 for your participation.

Participation and Withdrawal:
Participation in research is voluntary. If you choose not to participate, you will not be affected in any way. Your decision to participate or not participate in this research study will have no effect on you or your agency. If you would like to withdraw from the study, you can do so at any time by contacting us by phone.

Study Contact Information:
If you have any questions about this research study, you may contact Dr. Rosemary A. Condillac, C.Psych, Principal Investigator/Faculty Supervisor (905-688-5550 ext. 5671, e-mail: rcondillac@brocku.ca) (collect calls accepted) or Lisa Maire, Graduate Student/ Student Principal Investigator (e-mail lisa.maire@brocku.ca).

Research Ethics Board Contact:
The Research Ethics Board at Brock University may need to review records for monitoring purposes. As part of this review, someone may contact you from the Research Ethics Board to discuss your experience in the research study. This study has been reviewed and approved by the Brock Research Ethics Board. (File #) If you have questions or concerns about this study you may call the investigators listed above or the Brock University Research Ethics Officer in the Office of Research Services at 905-688-5550 ext. 3035, email: reb@brocku.ca.

Thank you,

Lisa Maire, B. A. Hons., Graduate Student
Graduate Student/ Student Principal Investigator
lisa.maire@brocku.ca

Dr. Rosemary A. Condillac, C. Psych.
Principal Investigator/Faculty Supervisor
(905) 688-5550 X5671
rcondillac@brocku.ca

This study has been reviewed and received ethics clearance through Brock University's Research Ethics Board (file # XXX)

Consent to Participate in a Research Study:

Name of Participant: _____

Consent:

- o I acknowledge that the research study described above has been explained to me and that any questions that I have asked have been answered to my satisfaction.
- o I have been informed of my right to choose that I not participate in the study.
- o As well, the potential risks, harms and discomforts have been explained to me and I understand the benefits of participating in the research study.
- o I understand that my legal rights have not been waived, nor have I released the investigators, sponsors, or involved institutions from their legal and professional duties.
- o I know that I may ask now or in the future any questions I have about the study or the research procedures.
- o I have been assured that information collected in the study will be kept confidential and that information will not be released or printed that would disclose the personal identity of participants without permission, unless required by law.
- o I understand that the data collected in this study may be used from time to time to address future research questions under the supervision of the Principal Investigator of this research and that privacy and confidentiality will be protected in such situations.
- o I have been given sufficient time to read and understand the above information.

By signing this consent, I agree to participate in this study. I will be given a signed copy of this consent form.

X_____ _____

Signature of Participant Name (printed)

_____

Date

By initialing here _____ I agree for the researchers to contact me in the future to participate in other research projects.

X_____ _____

Signature of Investigator Name (printed)

_____

Date

Parent/Guardian Consent for Child to Participate in a Research Study:

Child's Name: _____ Child's Birth Date: _____

Gender of Child: ___ Male ___ Female

Consent:

- I acknowledge that the research study described above has been explained to me and that any questions that I have asked have been answered to my satisfaction.
- I have been informed of my right to choose that I not participate in the study.
- As well, the potential risks, harms and discomforts have been explained to me and I understand the benefits of participating in the research study.
- I understand that my legal rights have not been waived, nor have I released the investigators, sponsors, or involved institutions from their legal and professional duties.
- I know that I may ask now or in the future any questions I have about the study or the research procedures.
- I have been assured that information collected in the study will be kept confidential and that information will not be released or printed that would disclose the personal identity of participants without permission, unless required by law.
- I understand that the data collected in this study may be used from time to time to address future research questions under the supervision of the Investigators of this research and that privacy and confidentiality will be protected in such situations.
- I have been given sufficient time to read and understand the above information.

By signing below, I agree to have my child participate in this study. I will be given a signed copy of this consent form.

X_____ _____

Signature of Parent/Guardian Name (printed)

_____

Date

By initialing here _____ I agree for the researchers to contact me in the future to participate in other research projects.

By initialing here _____ I give permission for my child's Behaviour Consultant to be provided with a summary of results of the questionnaires that I complete as part of this study.

X_____ _____

Signature of Investigator Name (printed)

_____

Date

Appendix C: Demographics Questionnaire – Caregiver

Caregiver's Name: _____

Contact number: _____

E-Mail: _____

Occupation: _____

Educational Background: *(check all that apply)*

- ❑ College Diploma in _____
- ❑ Bachelors Degree in _____
- ❑ Masters Degree in _____
- ❑ Doctoral Degree in _____

Name of Behaviour Consultant: _____

Name of Agency providing Behaviour Consultation: _____

_____

Child's Name: _____

Child's Date of Birth: _____

Appendix D: Assent Script for Child and Youth Participants

Investigator/Research Assistant:: "Hi, my name is _____. I'm here today to get to know you. Your [caregiver] is going to fill out a few forms for me about your behaviour, but he/she will be right over there the entire time. Is it okay for me to watch you play while he/she fills out the forms? "

Appendix E: Feedback Letter (results of study) – Caregivers

[Date]

Dear [caregiver],

We would like to thank you again for your participation the following study: *Functional Behaviour Assessment of Aggression and Self-Injury in Children and Youth with Autism Using Parent Report Questionnaires.* As a reminder, the purpose of this study is to compare results of three questionnaires that are commonly used to determine possible reasons why a particular challenging behaviour occurs. Also, the results of these questionnaires were compared to the results of the assessment completed by your behaviour consultant. Attached are a summary of the results from this study.

This research study is expected to contribute to lives of individuals with autism and their families in several ways. First off, the results of the behaviour assessment questionnaires will be communicated to your behaviour consultant upon completion of the study and as such may contribute to intervention planning for your child. Additionally, it is believed that the results obtained from this study will contribute to what is currently known about the utility of these questionnaires, and result in improved behaviour assessment methods. Better assessment will likely yield better interventions, and in turn, reduce challenging behaviours.

Please remember that any data pertaining to you as an individual participant will be kept confidential. Any data that identifies your family or your child will be kept locked at the Centre for Applied Disability Studies at Brock University, while the data being used for study analysis will remain password protected. We plan on sharing the results of this study with the research community through seminars, conferences, presentations, and journal articles. If you have any questions or concerns, please feel free to contact one of the investigators at the email addresses listed at the bottom of the page.

As with all Brock University projects involving human participants, this project was reviewed by, and received ethics clearance through the Research Ethics Board at Brock University. Should you have any comments or concerns resulting from your participation in this study, please contact Michelle McGinn at the Research Ethics Board (905) 688-5550, Ext.4730.

Lisa Maire, B. A. Hons.
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Graduate Student/Student Principal Investigator
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