

SCREENING FOR PSYCHOPATHOLOGY IN INDIVIDUALS WITH AUTISM  
USING THE VINELAND-II

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## Abstract

Research has consistently shown that individuals with autism spectrum disorders (ASD) in combination with an intellectual disability are at greater risk for developing psychopathology than are typically developing individuals. Individuals with ASD and intellectual disability are also at increased risk of psychopathology compared to those who have an intellectual disability alone. Given this risk, accurate monitoring and screening of psychopathology in this population is critical. However, there are few well validated measures of psychopathology designed specifically for this population. The Vineland Adaptive Behavior Scales – Second Edition (Vineland – II; Sparrow, Cicchetti, & Balla, 2005) is a commonly used measure of adaptive skills, and includes an optional Maladaptive Behavior Domain. The Maladaptive Behavior Domain consists of four sections, Internalizing, Externalizing, Other, and Critical Items. The Vineland-II has been used extensively with individuals who have an intellectual disability as well as with individuals who have ASD. However, the Maladaptive Behavior Domain has been overlooked in the literature and little information on its reliability, validity, or clinical utility exists. The utility of the Maladaptive Behavior Domain as a screening tool for psychopathology in individuals with ASD and intellectual disability was examined. The Vineland-II was administered to the parents/caregivers of 231 individuals between the ages of 3 and 41 years ( $M = 10$  years 4 months) with ASD and intellectual disability. A factor analysis of the items within the maladaptive domain revealed a solution composed of six factors, which were labelled Acting Out, Social Regulation, ASD, Emotion Regulation, Socially Inappropriate, and Self-Regulation. Five of the six new factors are substantially different from the original sections. The Externalizing scale was the only

original Vineland-II scale that remained relatively intact. These results suggest that for individuals with ASD and intellectual disability the Internalizing, Other, and Critical Items scales do not measure any well-defined constructs and thus do not yield meaningful information. The new factors appear to better categorize the Maladaptive Behavior Domain of the Vineland – II for individuals with ASD and intellectual disability. The reorganization of the Maladaptive Behavior Domain will allow for better detection of different forms of psychopathology in ASD and intellectual disability.

## Table of Contents

Abstract.....	ii
Table of Contents.....	iv
List of Tables.....	v
List of Figures.....	vii
Introduction.....	1
Psychopathology.....	3
Psychopathology in Intellectual Disability.....	3
Psychopathology in Autism.....	11
The Vineland Adaptive Behavior Scales – Second Edition.....	19
The Present Study.....	22
Method.....	25
Participants.....	26
Procedure.....	27
Measures.....	28
Results.....	32
Discussion.....	55
Clinical Implications.....	63
Limitations.....	64
Strengths.....	65
References.....	67

## List of Tables

Table 1: Participant Characteristics.....	27
Table 2: Pearson product-moment correlations among the component subscales of the Vineland-II Maladaptive Behavior Domain, autism severity, and age.....	33
Table 3: Pearson product-moment correlations among the component subscales of the Vineland-II Maladaptive Behavior Index and cognitive level.....	34
Table 4: Pearson product-moment correlations among the component subscales of the Vineland-II Maladaptive Behavior Index and adaptive skills.....	36
Table 5: Items omitted from the factor analysis.....	38
Table 6: Factor Correlation Matrix.....	40
Table 7: Factor loadings of original Internalizing items.....	41
Table 8: Factor loadings of original Externalizing items.....	42
Table 9: Factor loadings of original Other items.....	43
Table 10: Factor loadings of original Critical items.....	44
Table 11: Factor 1, Acting Out.....	45
Table 12: Factor 2, Social Regulation.....	46
Table 13: Factor 3, ASD.....	47
Table 14: Factor 4, Emotion Regulation.....	48
Table 15: Factor 5, Socially Inappropriate.....	49
Table 16: Factor 6, Self-Regulation.....	50
Table 17: Correlations among new factors, autism severity, and age.....	51
Table 18: Correlations among new factors and cognitive level.....	52
Table 19: Correlations among new factors and adaptive skills.....	53

Table 20: Correlations among Vineland maladaptive behaviour and CBCL scales.....	54
Table 21: Correlations among new factors, cognitive level, and adaptive skills.....	55

**List of Figures**

Figure 1: Scree Plot.....39

## Introduction

The purpose of the present study is to analyze the utility of a popular measure of adaptive behaviour, the Vineland Adaptive Behavior Scales – Second Edition (Vineland-II; Sparrow, Cicchetti, & Balla, 2005), as a screening tool for psychopathology and maladaptive behaviour among individuals with Autism Spectrum Disorder and intellectual disability.

Autism Spectrum Disorder (ASD) is defined by impairments in social interaction and communication and by restricted or repetitive behaviours (American Psychiatric Association [APA], 2013). Individuals with ASD experience difficulties in reciprocal social interaction, meaning that they have difficulty forming, understanding, and maintaining social relationships. Nonverbal communication skills are also impaired in ASD. This may include difficulties with maintaining eye contact, impaired gesture use or understanding, or impairments in the use or understanding of facial expressions. Repetitive or restricted patterns of behaviour are a criterion for the diagnosis of ASD. These behaviours may include preoccupation with one topic or area of interest, echolalia, or repetitive motor mannerisms. Individuals with ASD may also have difficulty coping with change or transitioning from one activity to the next (Perry et al., 2011). They may maintain inflexible or extremely rigid schedules or habit and become distressed when these are altered.

ASD often co-occurs with intellectual disability. Up to 75% of individuals with ASD also have some degree of intellectual impairment (Perry et al., 2011). The Diagnostic and Statistical Manual of Mental Disorders: 5th ed. (DSM-5; American Psychological Association, 2013) describes three criteria for intellectual disability. The



first criterion is below average intellectual functioning as measured by clinical assessment and standardized measures. The DSM-5 definition requires that individuals with intellectual disability have scores that are two standard deviations below the population mean on measures of intellectual functioning. If a measure has a mean of 100 and a standard deviation of 15, then scores of 70 and below would be in the range of intellectual disability. Second, the individual must demonstrate impairments in adaptive functioning resulting in failure to meet cultural standards for personal independence and social responsibility. Domains of adaptive behaviour include communication, social participation, activities of daily living, and independent living skills. Finally, these difficulties must manifest during the developmental period (APA, 2013). The DSM-5 also specifies four levels of severity based on adaptive functioning and level of support required mild, moderate, severe, and profound.

Often, the cognitive profile of individuals with ASD and intellectual disability is different from individuals who solely have intellectual disability. The pattern of cognitive skills in ASD is often uneven, with nonverbal skills typically better developed than verbal cognitive skills (Perry et al., 2011). Individuals with ASD and intellectual disability face significant challenges because of the cognitive, social, and communication difficulties inherent in these disorders. When mental health concerns are also present, the effects can increase impairment in school, home, and in the community (Brereton, Tonge, & Einfeld, 2006).

## **Psychopathology**

In the academic literature, mental health concerns are discussed using a variety of labels, including psychiatric issues, mental ill-health, and psychopathology. This paper will use the term psychopathology as the umbrella term for mental health concerns.

In general, it seems that one problem leaves an individual vulnerable to developing additional problems. For instance, it has been estimated that over 50% of individuals diagnosed with major depression will also be diagnosed with an anxiety disorder at some point in their lives (Minaya & Fresan, 2009). Among children with Attention Deficit-Hyperactivity Disorder (ADHD), some researchers have found rates of co-occurring learning disabilities to be as high as 75% (Mayes & Calhoun, 2007).

Comorbidity is a term that is often used to describe situations in which two or more disorders occur simultaneously within a single individual. However, use of the term comorbidity is often reserved for instances in which an individual is diagnosed with multiple disorders. Often an individual may be diagnosed with only one disorder but may also display symptoms of others at a subclinical level. When a person is already experiencing one disorder, symptoms of a second, even below diagnostic cut-off levels, may have a significant negative impact on that individual's level of functioning and on those around him or her. In this study, comorbidity will be used when referring to individuals diagnosed with more than one disorder as well as those who are diagnosed with one disorder and displaying symptoms of another at subclinical levels.

## **Psychopathology in Intellectual Disability**

Individuals with an intellectual disability are a group who are particularly vulnerable to developing comorbid psychopathology (de Ruiter, Dekker, Verhulst, &

Koot, 2007). As a group, individuals with an intellectual disability have been found to present with more mental health concerns at earlier ages compared to their peers without intellectual disabilities (Einfeld, Ellis, & Emerson, 2011; Kolaitis, 2008). As noted earlier, many, if not most individuals with ASD also experience some degree of intellectual disability (Perry et al., 2011). Given this common co-occurrence, the large amount of research on psychopathology in intellectual disability may be potentially valuable for the field of ASD as well.

According to de Ruiter and colleagues (2007), rates of psychopathology in children and adolescents with an intellectual disability may be up to seven times greater than in the general population. Estimates of comorbidity in this group are difficult to accurately determine due to a variety of issues. Some of these difficulties are common to many areas of prevalence research, such as sampling and measurement. However, additional unique complications exist for the field of intellectual disabilities. A key challenge in this area is the identification of psychopathology. Intellectual disability and psychopathology may be confounded. Low scores on cognitive and adaptive tests may be related to certain mental illnesses (Sloane, Durrheim, Kaminer, & Lachman, 1999). Diagnostic overshadowing occurs when problems related to psychopathology are mistakenly attributed to intellectual disability (Reiss, Levitan, & Szysko, 1982). Behavioural highlighting is another significant challenge to the identification of psychopathology in individuals with an intellectual disability. Behavioural highlighting occurs when severely challenging behaviour makes the detection of underlying mental health problems difficult (Summers, Bradley, & Flannery, 2011). With lower cognitive ability, communication skills are typically increasingly impaired. One of the greatest

hurdles to the identification of psychopathology may be the impairments in communication that are very often a part of an individual's intellectual disability. When assessing mental health concerns in individuals without intellectual disability, self-report measures are heavily relied upon. As the ability to report on one's internal states including moods, thoughts, or even pain and distress becomes compromised, greater emphasis is necessarily placed on observable behaviour and the reports of others such as parents, teachers, or group home staff, when attempting to determine the presence of any comorbid psychopathology.

Although rates as low as 10% and as high as 70% have been reported, it is generally thought that 35 to 40% of children and adolescents with an intellectual disability have at least one additional co-occurring disorder (Allen, 2008; Dykens, 2000; Einfeld, et al., 2011; Emerson & Hatton, 2007). Research on adults with intellectual disability generally reports elevated psychopathology at rates similar to those found in the child and adolescent literature (Cooper et al., 2007). Morgan, Leonard, Bourke, and Jablensky (2008) examined a large population-based database in Western Australia that consisted of over 9000 adults with an intellectual disability. They found that 31.7% of the adults with intellectual disability had some form of co-occurring psychopathology, based on the International Statistical Classification of Diseases and Related Health Problems (ICD-9) criteria (WHO, 1978).

**Risk factors.** A variety of individual, familial, social, and cultural variables have been suggested as potential risk factors for the development of psychopathology in the intellectual disability population.

Within the general population, factors such as family stress, lower socio-economic status, negative life events, and previously existing psychopathology are all related to higher levels of psychopathology. These same risk factors also seem to apply for individuals who have intellectual disabilities (Hove & Havik, 2010; Koskentausta, Iivanainen, & Almqvist, 2007; Wallander, Dekker, & Koot, 2006). However, the intellectual disability population also faces additional risk factors. In particular, Emerson and Hatton (2007) suggest that a substantial amount of the increased risk for psychopathology among individuals with intellectual disability may be related to the increased levels of social and psychological disadvantage experienced by this group. These types of broad risk factors are likely related to many of the other risk factors reported in the literature. For instance, the presence of epilepsy among individuals with intellectual disability has been linked to increased risk of psychopathology. Fitzgerald, Matson, and Barker (2011) suggest that it may be the associated deprivation and impairment in social and daily living skills, more than the epilepsy itself, that leads to increased levels of psychopathology. The true nature of these relationships is often difficult to determine because any given risk factor, such as the presence of seizures, may be related to a number of other factors, such as social deprivation. Additionally, in the case of epilepsy, accompanying neurological impairments are also thought to increase risk.

Communication difficulties, neurological deficits, decreased independence, and the experience of personal limitations were reported by de Ruiter and colleagues (2007) as factors related to increased psychopathology among individuals with intellectual disabilities. Koskentausta et al. (2007) reported that the risk of comorbid

psychopathology for their participants was associated with reduced socialization, communication impairments, and limited adaptive skills.

The majority of research on psychopathology and intellectual disability has focused on individuals with mild and moderate levels of cognitive impairment. However, there is a growing body of research suggesting that the more severe the intellectual disability, the greater the risk for co-occurring psychopathology (Dykens, 2000; Whitaker & Read, 2006). A longitudinal study by Einfeld et al. (2006) found that the rate of psychopathology was less likely to decline in participants with more severe intellectual disabilities over a period of eleven years than were participants in the mild range of intellectual disability.

Although increasing severity of intellectual disability seems to be related to higher levels of comorbidity, the relationship may not be straightforward. The relationship between severity of intellectual disability and comorbidity may depend, in part, on how psychopathology is defined and measured. It appears that when challenging behaviour is included in the definition of psychopathology, prevalence increases as intellectual impairment becomes more severe (Allen, 2008). However, Koskentausta and colleagues (2007) reported that the risk of psychopathology was greatest among children whose intellectual disability was within the moderate range. The expression of internalizing disorders, such as depression and anxiety, may present differently as intellectual impairment increases in severity due to increased impairments in communication and self-awareness (Chadwick, Kusel, Cuddy, & Taylor, 2005; Koskentausta et al., 2007). It is not unreasonable to expect that difficulties in communication and self-expression

resulting from intellectual disability may lead to the behavioural expression of internalizing disorders (Dykens, 2000).

Recent research is beginning to examine more closely the expression of mood disorders and emotional problems in individuals with severe and profound intellectual disability. Hayes, McGuire, O'Neill, Oliver, and Morrison (2011) looked specifically at the relationship between low mood and behaviour among a sample of 52 adults with severe and profound intellectual disability. These authors report that there was a higher rate and greater severity of challenging behaviour in those individuals classified as having low mood on the Mood, Interest, and Pleasure Questionnaire (MIPQ). The MIPQ is a caregiver-rated measure of mood specifically designed for use with individuals who have severe or profound intellectual disability (Ross & Oliver, 2003). Hayes et al. suggest that behavioural patterns may be useful when diagnosing mood disorders in people with severe or profound intellectual disability.

Forster, Gray, Taffe, Einfeld, and Tonge (2011) compared the differences in mental health concerns between individuals with severe intellectual disability and those with a profound level of impairment. This is a unique comparison, because, as the authors note, these two groups are frequently analyzed together (e.g., Hayes et al., 2011) and often without consideration of their differences. The authors found that people with a profound level of impairment displayed fewer disruptive behaviours than did the severe group. However, the authors also found that for the severe group, disruptive behaviours decreased substantially over a period of 12 years, meaning that as this group aged, mental health and behavioural concerns diminished. This pattern was not found for the profound group, whose disruptive behaviours remained stable across time. It should be noted that

this group contained many fewer participants and that only 12 participants remained at the end of the study, compared to 84 in the severe group. The results of the Forster et al. study suggest that patterns of psychopathology may differ between severely and profoundly affected individuals with intellectual disability. Whereas the individuals in the severe group displayed more behavioural signs of psychopathology, their behaviour was also more likely to improve over time.

Grouping aggression and other forms of challenging behaviour together as psychopathology is standard in the intellectual disability literature. This is likely, in part, due to the assessment tools used to diagnose psychopathology in individuals with an intellectual disability, as these measures often include a challenging or problem behaviour section or subscale. In their meta-analysis, McClintock et al. (2003) focused specifically on correlates of challenging behaviour in individuals with intellectual disability. These authors found that self-injurious behaviour (SIB) and stereotypy are more prevalent among individuals with severe and profound intellectual disabilities. They noted that individuals diagnosed with autism, in addition to an intellectual disability, were more likely to display aggression, stereotypy, destruction of property, and SIB than were those with intellectual disability alone. Several other studies examining risk factors have also linked the presence of autism to an increased risk for problem behaviours among individuals with intellectual disabilities (Chadwick, Kusel, & Cuddy, 2008; Emerson & Hatton, 2007).

The assumption throughout much of the literature has been that challenging behaviours are simple manifestations of psychopathology in individuals with intellectual disability. As communication and self-expression skills are impaired, it is believed that



psychopathology manifests itself through behaviour. Only recently have researchers begun examining challenging behaviours separately from psychopathology. Myrbakk and von Tetzchner (2008) compared levels of psychopathology between groups of closely matched individuals with intellectual disability with ( $n = 71$ ) and without ( $n = 71$ ) behaviour problems. The groups were matched on level of intellectual disability, sex, and age. Myrbakk and von Tetzchner used the Aberrant Behavior Checklist (ABC; Aman & Singh, 1986) to measure the level of participants' problem behaviors. Psychopathology was measured by one of four scales: The Reiss Screen for Maladaptive Behavior (Reiss, 1988), the Mini Psychiatric Assessment Schedule for Adults with Developmental Disability (Mini PAS-ADD; Prosser, Moss, Costello, Simpson, & Patel, 1997), the Diagnostic Assessment of the Severely Handicapped, Revised (DASH-II; Matson, 1995), or the Assessment of Dual Diagnosis (ADD; Matson & Bamburg, 1998). The authors used overall scores on these measures as a general measure of the presence or absence of psychopathology. Sixty-nine percent of their participants with problem behaviours also exhibited one or more forms of psychopathology compared to only 29% of the participants who did not display problem behaviours. If acting out behaviour is a form of expression of psychopathology, Myrbakk and von Tetzchner's findings would not be unexpected, as the concordance between the two should be high.

Allen (2008) reviewed the literature to examine the relationship between challenging behaviour and psychopathology. Allen suggests that psychopathology and challenging behaviours should be considered as separate but related phenomena, noting that most studies find rates of co-occurrence of between 10 and 20% for psychopathology and challenging behaviours, which is somewhat lower than the findings reported by

Myrbakk and von Tetzchner (2008). Allen suggests that acting out behaviour as an expression of psychopathology is only one of several possible relationships between the two phenomena. For instance, he also suggests that psychopathology may set the context for challenging behaviours to occur.

Overall, the literature suggests that problem behaviour and psychopathology are related in individuals with intellectual disability, but that this relationship is still not fully understood.

### **Psychopathology in Autism**

Using the Developmental Behaviour Checklist (Einfeld & Tonge, 1995), Brereton and colleagues (2006) investigated psychopathology and challenging behaviours in children, youth, and young adults with autism. They found that their group with autism ( $n = 381$ ) experienced higher rates of disruptive behaviour, self-absorbed behaviour, anxiety, communication problems, social relating, ADHD, and depression than did a comparison group of 550 individuals with intellectual disability but not autism. Similar results were found by Pearson and colleagues (2006) who reported that children and adolescents with autism ( $n = 26$ ) between the ages of 4 and 17 years ( $M = 9.5$  years) were at increased risk for depression, social withdrawal, atypical behaviours, and social skills impairments. The Personality Inventory for Children – Revised (PIC-R; Wirt, Lachar, Klinedinst, & Seat, 1984) was used as a measure of the internalizing and externalizing behaviours exhibited by the participants in this study. Pearson et al. used a comparison group ( $n = 25$ ) of children and adolescents between the ages of 4 and 18 years ( $M = 10.5$ ) who had a diagnosis of Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS). The effects of cognitive level were also controlled for and the differences

between the Autism and PDD-NOS groups remained. These results suggest that individuals with different forms of Autism Spectrum Disorder (ASD), or severity of ASD symptoms, may display different patterns of psychopathology. The Pearson et al. study suggests that as the severity of autism increases, the risk of psychopathology may increase as well.

Anderson, Maye, and Lord (2011) found a pattern similar to Pearson and colleagues (2006) in their sample of 192 individuals with autism between the ages of 9 and 18. Anderson et al. compared their sample of individuals with autism to a control sample of individuals with intellectual disability alone as well as a sample of individuals who did not meet strict criteria for autism on the Autism Diagnostic Interview – Revised (ADI-R) and the Autism Diagnostic Observation Schedule (ADOS) but were within the broader autism spectrum disorder. Falling in the category of broader autism spectrum disorder on the ADI-R and ADOS means that these individuals displayed several characteristics of autism but fell short of the cut-off for the disorder. Anderson et al. found that the participants in their autism group displayed more irritability, hyperactivity, and social withdrawal compared to the control groups. Anderson et al. report that it was the severity of intellectual disability rather than the severity of autism symptoms that accounted for the higher rates of externalizing behaviours. However, social withdrawal was not related to intellectual functioning.

Anderson et al. (2011) found that externalizing behaviours decreased with age in their autism sample. However, social withdrawal did not decrease with age and social withdrawal increased with age for approximately half of their autism group and a third of their broader autism spectrum group. Although Anderson et al. only included participants

up to the age of 18, their results suggest that, for individuals with autism, not all forms of psychopathology follow the same trajectory across the lifespan.

In a study of adults with autism, Melville et al. (2008) found that, compared to adults with intellectual disabilities who did not have autism, the autism group showed increased levels of maladaptive behaviours. However, the two groups had similar reported levels of psychopathology when challenging behaviours were excluded. Similarly, McCarthy et al. (2010) suggest that ASD in adults may be associated with challenging behaviour but not with psychopathology. They found higher levels of behaviour problems in a large sample of adults with autism and intellectual disability compared to adults with intellectual disability with no autism. These authors suggest that challenging behaviour and mental health problems are separate constructs.

Higher rates of internalizing symptoms have often been reported in individuals with ASD. Symptoms of anxiety, in particular, have been found to be present at higher rates in a number of studies comparing individuals with ASD to controls without ASD (e.g. Skokauskas & Gallagher, 2012). Helverschou, Bakken, and Martinsen (2011) point out that it is often difficult to differentiate symptoms of autism from symptoms of anxiety. For example, sleep problems, difficulty coping with novel situations, and a preference for order/rules are often reported in individuals with ASD and in individuals who are anxious. Given the overlap of symptoms, anxiety in ASD is difficult to identify and may be frequently misdiagnosed.

It is well established that autism frequently co-occurs with intellectual disability (Perry et al., 2011). Melville and colleagues (2008) concluded that by adulthood, individuals with autism together with intellectual disability have similar rates of

psychopathology to those who have an intellectual disability without autism. Tsakanikos et al. (2006) also found that their sample of adults with autism and intellectual disability displayed similar levels of psychopathology as a sample of adults with intellectual disability and no autism. However, in another study that included adolescents and young adults with autism, Bradley, Summers, Wood, and Bryson (2004) found that individuals with autism plus intellectual disability were rated higher on levels of anxiety, mania, depression, stereotypies, and sleep disorders than did a matched sample of individuals with only intellectual disability. These authors used the Diagnostic Assessment for the Severely Handicapped – Revised (DASH) as a measure of psychopathology in their sample (Matson, 1995). Lundstrom et al. (2011) concluded, in their total population twin cohort study, that psychopathology and maladaptive behaviours are present in the majority of cases of ASD for both children and adults. This study concluded that the more “autistic-like traits” one had, the greater the risk for developing mental health problems, even for those who did not meet criteria for autism. Lundstrom and colleagues found that autism was a risk factor for the development of ADHD, anxiety, conduct problems, depression, and substance abuse.

The literature generally demonstrates that children and adolescents with autism in combination with intellectual disabilities are at greater risk for developing psychopathology than are children and adolescents who have an intellectual disability alone. This increased risk seems to apply to both internalizing and externalizing disorders. Unfortunately, the research is less clear for adults with autism (e.g., Melville et al., 2008). However, several studies have found that adults with ASD are indeed at

increased risk for both internalizing and externalizing problems (e.g., Hofvander et al., 2009; Moseley, Tonge, Brereton, & Einfeld, 2011).

Anxiety is the comorbid disorder that is most often linked to ASDs (Gjevik et al., 2011). Gjevik et al. found that 41% of their sample of children and adolescents with ASD also met criteria for an anxiety disorder and 31% met criteria for ADHD as well. ADHD is also very frequently associated with ASDs (Bryson, et al., 2008). However, there are also many differences across studies which have led to some confusion among researchers and clinicians. It is likely that differences in sample characteristics, researcher focus and interpretation, and measurement techniques have contributed to differing conclusions across studies.

**Measuring psychopathology.** Variations in the reported levels and forms of psychopathology in autism are undoubtedly impacted by the method used to measure the psychopathology, among other factors. A staggering array of measurement techniques is reported in the research literature. For instance, Brereton, Tonge, and Einfeld (2006) used the Developmental Behaviour Checklist (Einfeld & Tonge, 1995) to assess their participants' behavioural and emotional problems. Pearson and colleagues (2006) used the Personality Inventory for Children – Revised (PIC-R; Wirt, Lachar, Klinedinst, & Seat, 1984). Melville et al. (2008) used the Psychiatric Assessment Schedules for Adults with Developmental Disabilities (PAS-ADD; Moss et al., 1998). Bradley et al. (2004) used the Diagnostic Assessment for the Severely Handicapped – Revised (DASH; Matson, 1995). Gjevik et al. (2011) used the Schedule for Affective Disorders and Schizophrenia for School Aged Children (Kiddie-SADS; Kaufman et al., 1997).

Different measures use different formats, focus on different age groups, word questions differently, include different disorders, and assess different aspects of psychopathology based on the varying theoretical perspectives and goals of the authors. Some of the measures have been designed for typically developing individuals and a few have been specifically created for use with individuals with ASDs or intellectual disabilities.

The Autism Spectrum Disorders – Comorbid for Children (ASD-CC; Matson & Gonzalez, 2007) is a rating scale that has been developed specifically to assess comorbidity in children with autism. The ASD-CC consists of 49 items, each rated on a 3-point scale. Factor analysis of the ASD-CC revealed seven factors: tantrum behaviour, repetitive behaviour, worry/depressed, avoidant behaviour, under-eating, conduct, over-eating (Matson, LoVullo, Rivet, Boisjoli, 2009).

The Psychopathology Checklists for Adults with Intellectual Disability (P-AID) are a series of checklists developed as a screening tool for comorbid disorders in adults with intellectual disability (Hove & Havik, 2008). There are ten psychopathology and eight problem-behaviour checklists. Each checklist focuses on a specific diagnosis. They vary in number of items and each has differing scoring and presentation rules. The psychopathology checklists include dementia, psychosis, depression, mania, agoraphobia, social phobia, specific phobia, generalized anxiety, panic disorder, and obsessive-compulsive disorder. The problem behaviour checklists are verbal aggression, physical aggression, destructive behavior, self-injurious behavior, sexually inappropriate behavior, oppositional behavior, demanding behavior, and wandering behavior. Principal components analyses of the P-AID checklists suggest that problem behavior, anxiety and

severe psychopathology are underlying components across the checklists. Hove and Havik also report that as the severity of intellectual disability increases, inter-rater agreement decreases.

When tools are developed for the general population, there is little evidence for their reliability and validity when used with individuals who have an ASD or an intellectual disability (Underwood, McCarthy, & Tsakanikos, 2011). Therefore, there is a need to develop tools designed specifically for ASD and intellectual disability populations. Most measures of psychopathology used in individuals with autism and intellectual disabilities have been informant-rated questionnaires or interviews. Because of impairments in communication and self-awareness skills is common among individuals with autism and intellectual disabilities, self-rating assessment tools have not been frequently used (Chadwick et al., 2005). The informants are typically caregivers or teachers who are familiar with the individual being assessed. A drawback of informant-rated measures is that they are necessarily entirely composed of items related to observable behaviour and, at best, are the rater's perceptions about the individual's emotions and internal states. The relationship between behaviour and psychopathology is subjective. For instance, the same behaviour in different individuals may be related to anxiety, depression, or problems with expressive communication, and the like. However, an informant-rated measure is the only means of assessment available when the individual does not have the cognitive, communication, or self-awareness skills to report on her or his internal states through questionnaires or interviews.

Some recent attempts have been made to improve the diagnosis of psychopathology in individuals with intellectual disabilities. For instance, the diagnostic



manual – intellectual disability (DM-ID) is an effort to adapt the Diagnostic and Statistical Manual of Mental Disorders: 4th ed., text revision (DSM-IV-TR) diagnostic criteria specifically for use with individuals with intellectual disabilities (American Psychological Association, 2000; Fletcher, Loschen, Stavrakaki, & First, 2007). For each disorder found in the DSM-IV-TR the DM-ID suggests modifications to specific criteria for individuals with intellectual disabilities. For the majority of criteria, separate modifications are suggested depending on the severity of intellectual disability.

Best practice guidelines for the diagnosis of ASD include an appropriate measure of autism symptomology, cognitive or intellectual skills, and adaptive skills (Perry, Condillac, & Freeman, 2002). This battery may leave little practical opportunity for the inclusion of additional measures. Clinicians may be unable or unwilling to incorporate additional measures, such as those measuring psychopathology, into their assessments of individuals with autism due to time limitations, financial, or various other constraints. This is regrettable due to the increased risk of psychopathology reported in the population and the potential risk of diagnostic overshadowing, in which all of the individual's symptoms are attributed to ASD, while other psychopathologies remain undiagnosed. Accurate identification of comorbid psychopathology within individuals with autism and developmental disabilities may be challenging to obtain, but is of the highest importance. The additional burden added by comorbid psychopathologies may result in significant distress and impairment for the individual and those around him or her (Leyfer et al., 2006). Comorbidities have the potential to impede otherwise effective interventions typically employed in ASD and intellectually disabled populations. Screening for

comorbid disorders or symptoms may help explain challenges an individual may be experiencing and thus allows for earlier and more targeted treatment.

### **The Vineland Adaptive Behavior Scales – Second Edition**

While none of the measures that have been developed to screen psychopathology within ASD or intellectual disability populations are in widespread use, there are other measures in wide use that do include maladaptive behaviour scales, such as: the Scales of Independent Behavior-Revised (SIB-R; Bruininks, Woodcock, Weatherman, & Hill, 1996), the Adaptive Behavior Scale-School-Second Edition (ABS-S: 2; Lambert, Nihira, & Leland, 1993), and the Vineland Adaptive Behavior Scales – Second Edition (Vineland-II; Sparrow, Cicchetti, & Balla, 2005).

The Vineland-II is a measure of adaptive behaviour that includes a maladaptive behaviour section which may be quick and convenient to administer within a diagnostic assessment. The Maladaptive Domain is composed of 50 items in four sections, namely Internalizing, Externalizing, Other, and Critical Items. The authors describe the Maladaptive Domain as a screening device that determines the need for further, in-depth evaluation of maladaptive behaviour. According to the manual, using data from the standardization sample, a principal components analysis was used to group 36 items of the Maladaptive Domain into “smaller homogeneous sets”. The resultant components were the Internalizing, Externalizing, and Other sections. The 14 items within the Critical Items section represent “more severe maladaptive behaviors that may provide clinically important information” (Sparrow, et al. 2005, p. 3). No information on the selection of the individual items within the Critical Items section is included in the Vineland-II manual.

Separate Internalizing and Externalizing scores are produced, as is an overall score, the Maladaptive Behavior Index (MBI). The MBI is based on the scores obtained in the Internalizing, Externalizing, and Other subscales. The Critical Items are not included in the calculation of the MBI. These items are not included in any scoring, and no information regarding their psychometric properties is included in the manual. However, the Critical Items subscale includes items that may have clinical importance and includes several items that are especially relevant to individuals with ASD and intellectual disability (e.g. Engages in inappropriate sexual behaviour, Expresses thoughts that do not make sense, or Displays behaviours that cause injury to self).

The Vineland-II manual provides a comparison of maladaptive scores from the normative sample with verbal and nonverbal children and adolescents with autism. The results suggest that individuals with autism exhibit higher levels of maladaptive behaviour overall, as well as within each of the Internalizing and Externalizing subscales (Sparrow et al., 2005). The difference between the sample with autism and the normative group in the Vineland-II manual was greatest on the Internalizing section. According to the authors, the higher scores in autism are partly due to the fact that a number of the Internalizing items are characteristics of autism (e.g. Avoids others and prefers to be alone, Has poor eye contact, or Avoids social interaction). The Externalizing section scores are slightly higher among those with autism than the normative sample, but are still within the average range. The authors suggest that this occurs because many of the items within the Externalizing scale are social in nature. The information regarding the Maladaptive Domain provided in the Vineland-II manual suggests that the characterization of internalizing and externalizing behaviours may not be appropriate for

individuals with autism due to the nature and characteristics associated with the disorder. The Critical Items, which are especially relevant for individuals with autism, are not included in the scoring.

During standardization of the Vineland-II, the maladaptive section was administered to parents of individuals with intellectual disability as well as to parents of children with autism. The manual reports the mean Internalizing, Externalizing, and MBI scores for a sample of 46 verbal children with autism between the ages of 3 and 16. The maladaptive section was also administered to parents of 31 nonverbal children between the ages of 3 and 15. When these samples of children with autism were compared to a non-clinical reference group, scores on the Internalizing, Externalizing, and MBI scales were higher for the autism group. For both groups of children with autism, the largest increase over the reference group was on the Internalizing subscale (Sparrow et al., 2005).

The maladaptive section was also given to caregivers of individuals with intellectual disability. Groups of individuals with intellectual disability were separated based on the degree of cognitive impairment, specifically mild, moderate, and severe-profound. Separate groups of adults and children at each level of cognitive impairment were assessed, producing a total of six groups of individuals with intellectual disability. In general, individuals with intellectual disability scored higher on the Internalizing and Externalizing subscales as well as the MBI as compared to a non-clinical reference group. There were very few exceptions: the group of children with mild intellectual disability was not significantly different from the reference group on the Externalizing subscale,

and children with severe-profound intellectual disability were lower on the Externalizing subscale than the reference group (Sparrow et al., 2005).

Wells, Perry, Levy, and Luthra (2009) examined the correlations between scores from the Maladaptive Domain and sex, age, cognitive level, adaptive skills, and severity of autism in a sample of 62 individuals with autism. There was no significant relationship between age and maladaptive behaviour, even though the sample ranged in age from 6 to 41 years of age (mean = 17 years). Similarly, there was no relationship between levels of adaptive and maladaptive behaviour. Verbal Mental Age (VMA) was not correlated with any measure of maladaptive behaviour, but Nonverbal Mental Age (NVMA) had a negative correlation with the Internalizing section. The sample, overall, was severely impaired in terms of cognitive level, with the mean full scale IQ of 25. As a result, the relationship between cognitive level and maladaptive behaviour may not be accurately reflected in this study because of the limited cognitive range. Females scored higher on the Internalizing and Critical Items subscales than males, with no sex differences on the Externalizing and Other subscales. Finally, severity of autism had a small correlation with scores on the Internalizing subscale.

### **The Present Study**

There are two purposes of the present study. The first is to evaluate the Vineland-II Maladaptive Domain, as a possible time-efficient instrument to measure psychopathology in individuals with ASD and intellectual disability. This study will build upon the findings of Wells et al. (2009) with a larger, more diverse sample (drawn from the Treatment, Research & Education for Autism and Developmental Disorders [TRE-ADD] program at Thistleton Regional Centre, and the Perry Lab at York University).

Wells et al. (2009) reported that the factor structure of the Maladaptive Domain was different in a sample of individuals with ASD and intellectual disability. The following hypotheses were examined in a sample of individuals with autism:

1. It is hypothesized that females will score higher than males on the Internalizing subscale. There is limited research on sex differences in psychopathology among individuals with ASD and intellectual disability. Although there is some research to suggest that females with ASD are at greater risk for internalizing disorders than are males (Solomon, Miller, Tayler, Hinshaw, & Carter, 2012).
2. The relationship between age and psychopathology in individuals with ASD and intellectual disability is not completely clear. The Vineland-II manual reports that for individuals with intellectual disability, the adult sample exhibited more maladaptive behaviours than did their school-age sample (Sparrow et al., 2005). Age differences on the Maladaptive Behavior Domain were not reported for individuals with ASD. Given the available evidence, it is believed that age will be positively correlated with overall maladaptive behaviour.
3. Severity of ASD has been linked to increasing levels of problems behaviours and psychopathology (e.g., Anderson et al., 2011; Pearson et al., 2006). Internalizing symptoms have been found to be higher among individual with ASD (e.g., Skokauskas & Gallagher, 2012). Additionally, given the number of items within the Internalizing and Critical Items scales that relate directly to the diagnosis of ASD, Autism severity will have a moderate positive correlation (approximate  $r$  between 0.3 and 0.5) with the Internalizing and Critical Items subscales.

4. Several studies suggest that the more severe the intellectual disability, the higher the risk for psychopathology (Dykens, 2000; Whitaker & Read, 2006). Therefore, it is hypothesized that cognitive level will have a moderate negative correlation (approximate  $r$  between -0.3 and -0.5) with maladaptive behaviour.
5. Impairments in communication skills and increased dependence on others have been linked in increasing levels of psychopathology (de Ruiter et al., 2007; Koskentausta et al., 2007). It is thought that adaptive skills will have a moderate negative correlation (approximate  $r$  between -0.3 and -0.5) with maladaptive behaviour.

The second purpose of this study is to further examine the factor structure of the Maladaptive Behavior Domain in a large sample of individuals with ASD and intellectual disability. Following the recommendations by Preacher and MacCallum (2003), principal axis q1 factoring (PAF) with direct oblimin rotation was used. Preacher and MacCallum note that EFAs, such as PAF, should be generally preferred over principal components analyses (PCA). They state: “An investigator wishing to identify interpretable constructs that explain correlations among Measured Variables (MVs) as well as possible should use factor analysis” (p. 21). The authors note that PCA is meant for atheoretical simple data reduction, with no attempt to account for variance in MVs due to error. In contrast, EFA is designed to determine the common underlying variation within the data attributable to latent variables (i.e., factors) that may have substantive meaning as theoretical constructs. All analyses were carried out using direct oblimin rotation.

Multiple methods were used to determine the number of factors to retain including Velicer's minimum average partial (MAP) test, parallel analysis, and visual inspection of the scree plot. As reported by O'Connor (2000), Velicer's MAP test and parallel analysis provide complimentary objective procedures for determining the appropriate number of factors. O'Connor reports that when the MAP test errs, it tends to underestimate the number of factors and when parallel analysis errs, it tends to overestimate the number of factors.

Coefficient alpha was calculated as a measure of the internal consistency for each factor emerging from the factor analysis (Cronbach, 1951). Coefficients above .7 are generally considered to be good (Streiner, 2003).

Using a subsample of participants, scores based on the resulting factors will be compared to an established measure of psychosocial functioning, the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) to assess concurrent validity.

### **Method**

This study was a file review of all files at TRE-ADD and the Perry Lab at York University. The author participated in the collection of the clinical data for approximately one third of the participants. TRE-ADD is a treatment centre for children, youth, and adults with autism and developmental disabilities, consisting of school, community, and residential programs. TRE-ADD is a program of the Thistleton Regional Centre operated by the Ministry of Children and Youth Services, Government of Ontario. TRE-ADD serves clients from Toronto, Peel, and York regions. Files in the Perry Lab have



been collected for clinical and research purposes. Parents have given consent for data to be used for research.

### **Participants**

Two-hundred thirty-one files met the inclusion criteria for this study, described below. Sixty percent ( $n = 139$ ) of the files utilized in this study were from the Perry Lab and 40% ( $n = 92$ ) were from TRE-ADD. All participants had a pre-existing diagnosis of Autistic Disorder or PDD-NOS, which was confirmed by a clinical psychologist using DSM-IV-TR criteria for the 139 participants from the York University database. Eighty-five percent of the sample was male ( $n = 197$ ) and 15% ( $n = 34$ ) were female. Table 1 summarizes participant characteristics.

Table 1. *Participant Characteristics*

	<i>n</i>	<i>M</i>	<i>SD</i>	Range
Age (years:months)	231	10:4	7:0	3:5 – 41:3
Cognitive Functioning				
Nonverbal IQ (NVIQ)	230	44.5	25.7	< 20-136
Verbal IQ (VIQ)	228	33.1	25.1	< 20-116
Full Scale IQ (FSIQ)	226	37.7	23.2	< 20-111
Childhood Autism Rating Scale (CARS)	229	33.6	5.3	20-46.5
Adaptive Skills				
(Standard Scores)				
Communication	231	54.2	19.2	21-104
Daily Living Skills	231	57.4	17.4	21-107
Socialization	231	53.4	16.4	20-110
Adaptive Behavior	230	54.0	16.9	20-103
Composite				

## Procedure

A file was included in the study if it contained the Vineland-II with a complete Maladaptive Behavior Domain. Files between the years 2006 and 2011 were utilized. A separate database was constructed containing only the information that was pertinent to the study, including demographic information, cognitive information, the Vineland-II, the CBCL, the Childhood Autism Rating Scale (CARS), and the DSM-IV-TR criteria for

autism. All identifying information was removed from this database. Four different measures of cognitive functioning (discussed next section) were found in client files. The scores used from these measures were the overall cognitive score full scale IQ, verbal IQ, and nonverbal IQ. If no standard score was available, ratio IQ scores were calculated by dividing age equivalent scores by the participant's chronological age then multiplying by 100. For older participants, a maximum of 14 years was used as the chronological age in the calculation of ratio IQ scores. As cognitive skills tend to plateau in adolescence and young adulthood, using the chronological age of older participants would result in artificially lower ratio IQ scores.

## **Measures**

**Vineland Adaptive Behavior Scales – Second Edition** (Vineland-II; Sparrow et al., 2005). This is a measure of adaptive and maladaptive behaviour administered by parent interview or via the parent questionnaire rating form. Standard scores were obtained for the Communication, Daily Living Skills, and Socialization domains. For children 6 years and under a Motor Skills domain is also administered and used in the calculation of overall adaptive skills. The Motor Skills domain was not utilized in the present study. The Adaptive Behavior Composite, which is the overall score of adaptive skills, was included. Individual item scores from all four sections of the Maladaptive Behavior Domain were obtained. The items within the Maladaptive Behavior Domain measure frequency of behaviour and are rated on a three-point scale. For each item respondents indicate if the individual being assessed engages in the behaviour: Never, Sometimes, or Often. If the behaviour is reported as never occurring, the item is assigned a score of zero. If the behaviour sometimes occurs, it is assigned one point. If the

behaviour is reported to occur often, the item is assigned two points. For the Internalizing, Externalizing, and Other sections within the Maladaptive Behavior Domain, raw scores for the section are produced by totalling the scores of the items within that section. Higher scores indicate more behavioural difficulties within that section.

**The Childhood Autism Rating Scale** (CARS; Schopler, Reichler, & Renner, 1988). The CARS is an observational measure of the severity of autism. Trained observers rate 15 categories on a scale of 1 to 4. Half-point scores are used (e.g., 1, 1.5, 2, 2.5 etc.) providing the user with a seven-point scale. The total score ranges from 15 to 60, with higher scores indicating higher severity. Scores below 30 are labelled as no autism. However, individuals with atypical or fewer severe symptoms of autism, such as those with PDD-NOS or Asperger's Syndrome, frequently have CARS scores below 30, as would individuals with Intellectual Disabilities but not autism.

Scores between 30 and 36.5 are categorized as mild-moderate symptoms of Autism Spectrum Disorder, and scores of 37 or greater are classified as severe symptoms of autism. In the present study, if an individual's CARS score was below 30, that person was included in the study if she or he met DSM-IV-TR criteria for Autistic Disorder or PDD-NOS.

**The Mullen Scales of Early Learning** (Mullen, 1995). This is a standardized, norm-referenced measure of children's cognitive functioning and is designed for children from birth to 5 years of age. The Mullen is made up of four domains: Expressive Language, Receptive Language, Visual Reception, and Fine Motor. The median age-equivalent of the four domains was used to calculate mental age and ratio IQ scores. The measure has high

internal consistency, test-retest, and inter-rater reliability (Mullen, 1995). In addition, concurrent, construct, and content validity have been established with other measures of early development including the Bayley Scales of Infant and Toddler Development (correlations range from .21 to .76), The Preschool Language Assessment (correlations range from .72 to .85), and the Peabody Developmental Motor Scales (correlations range from .65 to .82) (Mullen, 1995).

**The Stanford-Binet Intelligence Scale: Fifth Edition** (SB-5; Roid, 2003). This is a standardized, norm-referenced measure of cognitive skills for individuals between the ages of 2 and 85 years. The SB-5 measures Fluid Reasoning, Knowledge, Quantitative Reasoning, Visual-Spatial Processing, and Working Memory. Each of these domains is assessed both verbally and non-verbally. The test produces a Nonverbal IQ score, a Verbal IQ score, and a Full Scale IQ. The SB-5 has high reliability for subtests and indexes (Roid, 2003). Convergent validity has been established with the Wechsler Intelligence Tests (correlations range from .42 to .85) and the Woodcock-Johnson Tests of Cognitive Abilities: Third Edition (correlations range from .36 to .90; Roid, 2003).

**The Wechsler Intelligence Scale for Children: Fourth Edition** (WISC-IV; Wechsler, 2003). This is a standardized, norm-referenced measure of cognitive skills and is used for individuals between the ages of 6 and 17 years. The WISC-IV measures cognitive performance in four indices: Verbal, Performance, Working Memory, and Processing Speed. In addition to each of these index scores, the WISC-IV produces a Full Scale IQ score. It has good internal consistency and test-retest reliability (Wechsler, 2003).

### **Wechsler Preschool and Primary Scale of Intelligence: Third Edition**

(WPPSI-III; Wechsler, 2002). The WPPSI-III is a standardized, norm-referenced measure of cognitive skills for children between the ages of 2 years, 6 months and 7 years, 3 months. Cognitive skills are measured in Verbal, Performance, and Processing Speed domains. The WPPSI-II has very good internal consistency and adequate test-retest reliability (Wechsler, 2002). Convergent validity has been established with the Children's Memory Scale (correlations range from .07 to .79), the Wechsler Individual Achievement Test: Second Edition (correlations range from .31 to .78), Bayley Scales of Infant Development: Second Edition (correlations range from .32 to .80), and the Differential Ability Scales (correlations range from .38 to .87) (Wechsler, 2002).

**The Child Behavior Checklist** (CBCL; Achenbach & Rescorla, 2001). For the subsample of participants ( $n = 49$ ) for whom CBCL data were available, it was used as a measure of psychosocial functioning. The CBCL is a parent-rated scale of behavioural and emotional problems for children between the ages of 6 and 18. The CBCL provides ratings for the total amount of problem behaviour within eight specific scales (Withdrawn/Depressed, Somatic complaints, Anxious/Depressed, Social Problems, Thought Problems, Attention Problems, Rule-Breaking Behavior, and Aggressive Behaviour), two broad scales (Externalizing and Internalizing Behaviours), and a total score. In a study of youth with autism, Pandolfi, Magyar, and Dill (2011) found that the CBCL was able to discriminate between youth who had been diagnosed with only autism and those with autism plus one or more co-occurring disorders (including depression, anxiety, ADHD, and ODD). The CBCL manual (Achenbach & Rescorla, 2001) reports very good test-retest reliability and cross-informant agreement. Convergent validity has

been established with the Conners Parent Rating Scale – Revised and the Conners Teacher Rating Scale – Revised, with correlations ranging from .71 to .85 (Achenbach & Rescorla, 2001). Correlations between the CBCL and the Behavior Assessment System for Children ranges from .38 to .89 (Achenbach & Rescorla, 2001).

## Results

Pearson product-moment correlations were used to measure the strength of association among variables. When measuring strength of association between two variables,  $r = .10$  to  $.29$  is considered small,  $r = .30$  to  $.49$  is medium, and  $r = .5$  or greater is considered to be a large effect size (Cohen, 1992; Kraemer et al., 2003).

The first hypothesis predicted that female participants would score higher on the Internalizing subscale of the Vineland-II compared to male participants. An independent samples  $t$ -test was used to compare male and female participants on the Internalizing subscale of the Vineland-II. This test provides no evidence of a difference based on sex ( $t = 1.43$ ,  $p = .16$ ). Therefore, the first hypothesis was not supported.

The second hypothesis predicted that age would be positively correlated with overall maladaptive behaviour. The correlation between age and overall maladaptive behaviour was  $r = .27$  ( $p = .001$ ), which is approaching a medium effect size, and provides support for the second hypothesis.

The third hypothesis predicted that there would be medium correlations between autism severity and the Internalizing and Critical Items subscales. The relationship between autism severity and the Internalizing subscale ( $r = .22$ ,  $p = .001$ ) was small, significant, and approaching medium. The correlation between autism severity and the

Critical Items subscale ( $r = .16, p = .02$ ) was small. Although both correlations were in the predicted direction, neither reached the predicted effect size. The relationships among age, the severity of autism, and the maladaptive raw scores of the Vineland-II are shown in Table 2. The strength of all of the relationships was small. The relationship between age and the Externalizing scale ( $r = .27, p = .001$ ) and between age and overall maladaptive behaviour ( $r = .27, p = .001$ ) approached the standard for medium strength.

Table 2. *Pearson product-moment correlations among the component subscales of the Vineland-II Maladaptive Behavior Domain, autism severity, and age*

	Vineland-II Maladaptive Behavior Domain				
	Internalizing	Externalizing	Other	Critical	MBI
Age	.21**	.27**	.12	.26**	.27**
( <i>n</i> )	(230)	(229)	(227)	(224)	(227)
CARS	.22**	.004	.19**	.16*	.21**
( <i>n</i> )	(228)	(227)	(225)	(222)	(225)

Note. \*  $p < .05$  (2-tailed). \*\*  $p < .01$  (2-tailed). MBI = Maladaptive Behavior Index, CARS = Childhood Autism Rating Scale.

Table 3 presents the correlations of Vineland-II maladaptive scores with cognitive skills (Nonverbal IQ, Verbal IQ, and Full Scale IQ) and adaptive skills (Communication, Daily Living Skills, Socialization, and the Adaptive Behavior Composite). The fourth hypothesis predicted that cognitive level would have a moderate negative correlation with



maladaptive behaviour. Overall cognitive level, Full Scale IQ, was not significantly related to overall maladaptive behaviour ( $r = -.08, p = .23$ ). However, the majority of IQ scores in the sample were below 69 which limited variability; thus, the correlation may be attenuated by restriction of range.

Table 3. *Pearson product-moment correlations among the component subscales of the Vineland-II Maladaptive Behavior Index and cognitive level*

	Vineland-II Maladaptive Behaviour Scores				
	Internalizing	Externalizing	Other	Critical	MBI
VIQ	-.02	.09	-.14*	-.05	-.04
( <i>n</i> )	(228)	(227)	(225)	(221)	(225)
NVIQ	-.07	.03	-.15*	-.09	-.09
( <i>n</i> )	(230)	(229)	(227)	(223)	(227)
FSIQ	-.06	.05	-.15*	-.08	-.08
( <i>n</i> )	(226)	(225)	(223)	(219)	(223)

Note. \*  $p < .05$  (2-tailed). \*\*  $p < .01$  (2-tailed). MBI = Maladaptive Behavior Index, VIQ = Verbal IQ, NVIQ = Nonverbal IQ, FSIQ = Full Scale IQ.

Correlations between Vineland-II maladaptive scores and adaptive skills (Communication, Daily Living Skills, Socialization, and the Adaptive Behavior Composite) are presented in Table 4. Adaptive behaviour had stronger associations with

maladaptive behaviour than did cognitive skills. The majority of correlations were negative, significant, and in or near the medium range (e.g., overall adaptive behaviour was negatively related to overall maladaptive behaviour,  $r = -.26$ ,  $p = .001$ ). These results generally support the fifth hypothesis, which predicted that adaptive skills would have moderate negative correlations with maladaptive behaviour. The Vineland-II Externalizing scale had the weakest correlations with both cognition and adaptive behaviour. None of the correlations between the Externalizing scale and cognitive or adaptive behaviour scales was statistically significant.

Table 4. *Pearson product-moment correlations among the component subscales of the Vineland-II Maladaptive Behavior Index and adaptive skills*

	Vineland-II Maladaptive Behaviour Scores				
	Internalizing	Externalizing	Other	Critical	MBI
Communication	-.23**	-.05	-.15*	-.20**	-.20**
( <i>n</i> )	(230)	(229)	(227)	(224)	(227)
DLS	-.27**	-.14*	-.21**	-.23**	-.29**
( <i>n</i> )	(230)	(229)	(227)	(224)	(227)
Socialization	-.25**	-.11	-.15*	-.26**	-.24**
( <i>n</i> )	(230)	(229)	(227)	(224)	(227)
ABC	-.28**	-.12	-.17**	-.25**	-.26**
( <i>n</i> )	(229)	(228)	(226)	(223)	(226)

Note. \*  $p < .05$  (2-tailed). \*\*  $p < .01$  (2-tailed). MBI = Maladaptive Behavior Index, DLS = Daily Living Skills, ABC = Adaptive Behavior Composite.

Based on the above analyses, there are no apparent sex differences on the Internalizing subscale. Age is positively related to scores on the Internalizing, Externalizing, and Critical Items scales. The overall Maladaptive Behavior Index score (MBI) was also positively related to age. The Other subscale did not have a significant

relationship with age. Severity of autism was positively related to the Internalizing and Other subscales as well as the MBI. Cognition generally had a small negative relationship with maladaptive behaviour. Adaptive skills generally demonstrated a small to moderate negative relationship with maladaptive behaviour.

Wells et al. (2009) suggested the factor structure of the items within the Maladaptive Domain was different for individuals with ASD and intellectual disability. Thus, an exploratory factor analysis (EFA) was performed on the individual items within the Maladaptive Behavior Domain of the Vineland-II. Seven items were omitted from the analysis due to a lack of variance in the sample (listed in Table 5). All of the items that were not included in the analysis came from the Other and Critical Items sections of the Maladaptive Behavior Domain. The omitted items were generally those that are not applicable or relevant for individuals with cognitive and adaptive skills in the moderate, severe, and profound ranges. Thus, a total of 43 items were included in the factor analysis.

Table 5. *Items omitted from the factor analysis*

Section of Maladaptive	Item
Behavior Index	
Other	9. Uses school or work property for unapproved personal purposes. 11. Runs away. 12. Is truant from school or work. 14. Uses money or gifts to “buy” affection. 15. Uses alcohol or illegal drugs during the school or work day.
Critical Items	13. Is unable to complete a normal school or work day because of chronic pain or fatigue. 14. Is unable to complete a normal school or work day because of psychological symptoms.

For the present dataset, Velicer’s MAP test indicated that a 4-factor solution was an appropriate fit to the data and the Parallel Analysis indicated an 8-factor solution. Visual inspection of the Scree Plot (see Figure 1) suggested that a 6-factor solution may be the most appropriate. After a review of the results, the 6-factor solution was selected as the most theoretically interpretable of the solutions. This solution accounted for 39.18% of the variance in item scores. Each factor includes a minimum of seven individual items and accounts for at least 3.96% of the variance in item scores.

Correlations among the factors are shown in Table 6. Tables 7 through 10 present the factor loadings and communalities for the items from the Internalizing, Externalizing, Other, and Critical Items scales. An item was assigned to a factor based on that item's factor loading and whether or not the item fits conceptually with other the items within the factor. No rigid cut off value for factor loadings was used, as the conceptual fit of the item was considered to be of primary importance. Seven items were included in two factors and one item was placed into three.

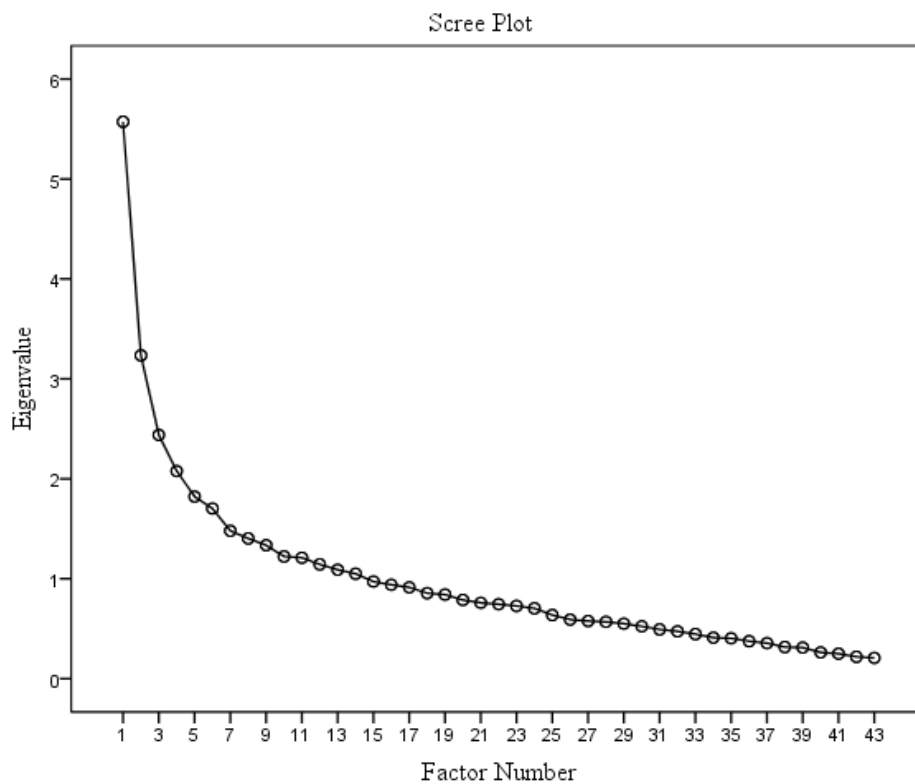


Figure 1. Scree plot

Table 6. *Factor Correlation Matrix*

Factor	1	2	3	4	5	6
1	1.00					
2	.18	1.00				
3	.18	.04	1.00			
4	-.21	.02	-.23	1.00		
5	.04	-.10	.13	-.08	1.00	
6	.11	.02	.13	-.02	.13	1.00

Table 7. *Factor loadings of original Internalizing items*

	Factor						Com
	1	2	3	4	5	6	
Is overly dependent	.13	.10	-.04	<b>-.37</b>	-.01	.16	.21
Avoids others and prefers to be alone	-.14	.14	<b>.64</b>	-.02	.05	-.06	.42
Has eating difficulties	-.08	-.01	.21	-.12	-.05	<b>.34</b>	.19
Has sleep difficulties	.14	-.09	-.04	<b>-.37</b>	.04	.31	.29
Refuses to go to school because of fear	.15	<b>.35</b>	.09	.03	-.08	.26	.26
Is overly anxious or nervous	.16	.22	.00	<b>-.56</b>	.12	-.01	.45
Cries or laughs too easily	.02	.02	.02	<b>-.49</b>	-.11	-.14	.27
Has poor eye contact	-.02	-.01	.18	-.02	-.06	<b>.47</b>	.27
Is sad for no clear reason	.07	.01	.19	<b>-.39</b>	-.06	-.00	.24
Avoids social interaction	-.01	.05	<b>.71</b>	-.06	-.09	.06	.54
Lacks energy or interest in life	.02	.09	<b>.26</b>	-.10	.13	.01	.13

Note. Com = Communality



Table 8. *Factor loadings of original Externalizing items*

	Factor						Com
	1	2	3	4	5	6	
Is impulsive	<b>.35</b>	-.06	.26	-.17	.16	.10	.36
Has temper tantrums	<b>.50</b>	-.15	.09	-.27	.07	.03	.43
Intentionally disobeys those in authority	<b>.63</b>	.04	.04	.07	-.15	-.01	.42
Taunts, teases, or bullies	<b>.56</b>	.09	-.15	-.08	-.04	-.06	.35
Is inconsiderate or insensitive to others	<b>.57</b>	.16	-.09	.11	-.06	.04	.37
Lies, cheats, or steals	<b>.36</b>	.30	-.07	.18	-.14	.00	.29
Is physically aggressive	<b>.49</b>	-.05	.14	-.27	.35	-.13	.57
Is stubborn or sullen	<b>.60</b>	-.04	.02	.01	.02	.03	.36
Says embarrassing things in public	-.00	<b>.68</b>	-.03	-.10	-.04	.00	.47
Behaves inappropriately at the urging of others	.17	<b>.37</b>	-.13	-.00	.06	.05	.19

Note. Com = Community

Table 9. *Factor loadings of original Other items*

	Factor						Com
	1	2	3	4	5	6	
Sucks thumb or fingers	-.09	-.02	-.07	.08	<b>.25</b>	.11	.10
Wets bed	.01	<b>-.42</b>	-.14	-.18	-.02	.33	.31
Acts overly familiar with strangers	.07	-.05	.00	.00	<b>.36</b>	-.05	.13
Bites fingernails	.02	<b>.28</b>	.04	.14	.25	.25	.23
Has tics	-.10	.20	.12	-.10	<b>.37</b>	.03	.20
Grinds teeth	-.02	-.02	-.04	.01	.13	<b>.40</b>	.19
Has a hard time paying attention	.19	-.01	<b>.40</b>	.08	-.05	.33	.36
Is more active or restless than others of same age	<b>.29</b>	-.16	.09	-.05	.11	.07	.15
Swears	.07	<b>.49</b>	-.05	-.00	.06	-.05	.25
Ignores or doesn't pay attention to others around him or her	.14	.20	<b>.36</b>	.27	.17	.19	.33

Note. Com = Communality

Table 10. *Factor loadings of original Critical Items*

	Factor						Com
	1	2	3	4	5	6	
Engages in inappropriate sexual behaviour	.15	-.13	.30	-.11	<b>.33</b>	-.20	.32
Is obsessed with objects or activities	.13	.07	<b>.26</b>	-.18	-.05	-.03	.16
Expresses thoughts that do not make sense	-.07	<b>.37</b>	.09	-.25	-.09	-.02	.21
Has strange habits or ways	-.02	-.11	<b>.37</b>	-.32	.06	.02	.31
Consistently prefers objects to people	.09	-.16	<b>.51</b>	.07	-.19	.12	.32
Displays behaviours that cause injury to self	.10	-.10	.14	-.30	<b>.33</b>	-.00	.31
Destroys own or another's possessions on purpose	<b>.47</b>	.11	.08	-.19	.05	-.13	.35
Uses bizarre speech	.06	.11	.32	-.12	<b>-.48</b>	-.08	.36
Is unaware of what is happening around him or her	.03	-.06	<b>.37</b>	.12	.20	.08	.22
Rocks back and forth repeatedly	-.07	-.11	.12	<b>-.24</b>	.17	-.07	.14
Is unusually fearful of ordinary sounds, objects, or situations	.01	.05	-.13	<b>-.41</b>	.02	.24	.22
Remembers odd information in detail years later	-.03	<b>.66</b>	.12	-.10	-.11	-.01	.49

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Note. Com = Communality

The first factor to emerge from the EFA is mainly defined by 10 items, 8 of which come from the Externalizing scale of the Vineland-II. In addition to the Externalizing items, one item from the Other scale (Is more active or restless than others of same age) and one from the Critical Items scale (Destroys own or another's possessions on purpose) were also related to this factor. The items defining this factor are generally aggressive, destructive, or otherwise acting out types of behaviours (see Table 11). For the first factor, Cronbach's  $\alpha = .77$ .

Table 11. *Factor 1, Acting Out*

Original Maladaptive Behavior Index Section	Item
Externalizing – 1	Is impulsive
Externalizing – 2	Has temper tantrums
Externalizing – 3	Intentionally disobeys and defies those in authority
Externalizing – 4	Taunts, teases, or bullies
Externalizing – 5	Is inconsiderate or insensitive to others
Externalizing – 6	Lies, cheats, or steals
Externalizing – 7	Is physically aggressive
Externalizing – 8	Is stubborn or sullen
Other – 8	Is more active or restless than others of same age
Critical Items – 7	Destroys own or another's possessions on purpose

The second new factor is largely defined by eight items ( $\alpha = .69$ ) from each of the four original scales (one Externalizing item, three Internalizing, two Other, and two

Critical Items). The items related to this factor generally concern inappropriate or ineffective social behavior and is therefore labeled “Social Regulation”. The items defining the Social Regulation factor are listed in Table 12.

Table 12. *Factor 2, Social Regulation*

Original Maladaptive Behavior Index Section	Item
Internalizing – 5	Refuses to go to school or work because of fear, feelings of rejection or isolation, etc.
Externalizing – 6	Lies, cheats, or steals
Externalizing – 9	Says embarrassing things or asks embarrassing questions in public
Externalizing – 10	Behaves inappropriately at the urging of others
Other – 4	Bites fingernails
Other – 10	Swears
Critical Items – 3	Expresses thoughts that do not make sense
Critical Items – 12	Remembers odd information in detail years later

The third factor is defined by items that are consistent with behaviours that may be symptomatic of Autism Spectrum Disorders (ASD). The 11 items ( $\alpha = .70$ ) defining this “ASD” factor include items that may be considered “social” in nature (e.g. avoids others and prefers to be alone), items related to communication (e.g., Uses bizarre speech), and items that are related to repetitive behaviour (e.g., Is obsessed with objects or activities). Therefore, many of the impairments required for a diagnosis ASD are represented in this factor. Items from all four original Vineland-II maladaptive scales are represented in the ASD factor. The items defining the third factor are listed in Table 13.

Table 13. *Factor 3, ASD*

Original Maladaptive Behavior Index Section	Item
Internalizing – 2	Avoids others and prefers to be alone
Internalizing – 10	Avoids social interaction
Internalizing – 11	Lacks energy or interest in life
Other – 7	Has a hard time paying attention
Other – 13	Ignores or doesn't pay attention to others around him or her
Critical Items – 1	Engages in inappropriate sexual behavior
Critical Items – 2	Is obsessed with objects or activities
Critical Items – 4	Has strange habits or ways
Critical Items – 5	Consistently prefers objects to people
Critical Items – 8	Uses bizarre speech
Critical Items – 9	Is unaware of what is happening around him or her

The fourth factor is determined by nine items ( $\alpha = .67$ ), five from the Internalizing scale and four from the Critical Items scale. Items within this group focus on mood and emotionality (e.g., Is overly anxious or nervous). This factor is labelled “Emotion Regulation” and the items that compose this factor are listed in Table 14.

Table 14. *Factor 4, Emotion Regulation*

Original Maladaptive Behavior Index Section	Item
Internalizing – 1	Is overly dependent
Internalizing – 4	Has sleep difficulties
Internalizing – 6	Is overly anxious or nervous
Internalizing – 7	Cries or laughs too easily
Internalizing – 9	Is sad for no clear reason
Critical Items – 4	Has strange habits or ways
Critical Items – 6	Displays behaviors that cause injury to self
Critical Items – 10	Rocks back and forth repeatedly
Critical Items – 11	Is unusually fearful of ordinary sounds, objects, or situations

The fifth new factor is mainly determined by seven items ( $\alpha = .49$ ), one Externalizing, four Other, and two Critical Items. This factor is labeled “Socially Inappropriate”. The behaviours listed in the items that define this factor may appear socially awkward, upsetting, or odd to others, therefore making successful social interaction difficult (e.g., Sucks thumb or fingers). The items defining the “Socially Inappropriate” factor are listed in Table 15.

Table 15. *Factor 5, Socially Inappropriate*

Original Maladaptive	Item
Behavior Index Section	
Externalizing – 7	Is physically aggressive
Other – 1	Sucks thumb or fingers
Other – 3	Acts overly familiar with strangers
Other – 4	Bites fingernails
Other – 5	Has tics
Critical Items – 1	Engages in inappropriate sexual behaviour
Critical Items – 6	Displays behaviours that cause injury to self

The sixth and final factor is made up of a total of seven items ( $\alpha = .52$ ), three from the Internalizing scale and four from the Other scale. The items in this factor are listed in Table 16. This factor has been labelled “Self-Regulation”. The items defining this factor are behaviours that are not directed at others, but rather are self-directed (e.g., Has eating difficulties).



Table 16. *Factor 6, Self-Regulation*

Original Maladaptive Behavior Index Section	Item
Internalizing – 3	Has eating difficulties
Internalizing – 4	Has sleep difficulties
Internalizing – 8	Has poor eye contact
Other – 2	Wets bed or must wear diapers at night
Other – 4	Bites fingernails
Other – 6	Grinds teeth during the day or night
Other – 7	Has a hard time paying attention

Pearson product-moment correlations among scores based on the six new factors and participant variables were calculated. Scores for each of the factors were produced in the same manner as for the original Maladaptive Behavior Domain by adding the scores from the individual items within the factor. Table 17 displays the correlations between the Childhood Autism Rating Scale (CARS) score and participant's age with the new factors. Most of the scores representing the new factors were positively correlated with age and autism symptoms. The majority of the relationships were in the small or medium strength range. Factor 4, "Emotion Regulation" had the strongest positive association with age. Factor 6, "Self-Regulation," was not significantly related to age but had the strongest relationship with autism severity. Factor 1, "Acting Out," had a small relationship with age but no significant correlation with autism symptoms. Factor 2,

“Social Regulation” was the only factor to have a negative association with autism severity.

Table 17. *Correlations among new factors, autism severity, and age*

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Age	.19**	.28**	.21**	.30**	.38**	.06
( <i>n</i> )	(213)	(215)	(215)	(212)	(219)	(224)
CARS	.09	-.32**	.26**	.23**	.24**	.28**
( <i>n</i> )	(211)	(213)	(213)	(210)	(217)	(212)

Note. \*  $p < .05$  (2-tailed). \*\*  $p < .01$  (2-tailed). CARS = Childhood Autism Rating Scale.

Table 18 displays the relationship among the six factor scales and cognitive scores. Table 19 displays the relationship between the factor scales and adaptive scores. Scales based on factors 3, 4, 5, and 6 have small to moderate negative relationships with cognitive and adaptive scores. Factor 1, “Acting Out,” has little or no significant relationship with cognition and small correlations with adaptive scores. In contrast with all other factors, Factor 2, “Social Regulation,” is positively related to the cognitive and adaptive scores, although the relationship with adaptive scores is not as strong as the relationship with cognitive scores.

Table 18. *Correlations among new factors and cognitive level*

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
VIQ	-.02	.42**	-.13	-.12	-.27**	-.14*
( <i>n</i> )	(212)	(213)	(213)	(210)	(217)	(222)
NVIQ	-.06	.36**	-.12	-.21**	-.32**	-.10
( <i>n</i> )	(213)	(215)	(215)	(212)	(219)	(224)
FSIQ	-.05	.38**	-.14*	-.18*	-.28**	-.13
( <i>n</i> )	(210)	(211)	(211)	(208)	(215)	(220)

Note. \*  $p < .05$  (2-tailed). \*\*  $p < .01$  (2-tailed). VIQ = Verbal IQ, NVIQ = Nonverbal IQ, FSIQ = Full Scale IQ.

Table 19. *Correlations among new factors and adaptive skills*

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Communication	-.09	.15*	-.23**	-.32**	-.40**	-.15*
( <i>n</i> )	(213)	(215)	(215)	(212)	(219)	(224)
DLS	-.16*	.14*	-.24**	-.36**	-.40**	-.20**
( <i>n</i> )	(213)	(215)	(215)	(212)	(219)	(224)
Socialization	-.14*	.11	-.29**	-.35**	-.44**	-.07
( <i>n</i> )	(213)	(215)	(215)	(212)	(219)	(224)
ABC	-.15*	.13	-.28**	-.37**	-.44**	-.14*
( <i>n</i> )	(212)	(214)	(214)	(211)	(218)	(223)

Note. \*  $p < .05$  (2-tailed). \*\*  $p < .01$  (2-tailed). DLS = Daily Living Skills, ABC = Adaptive Behavior Composite.

Finally, for the subset of participants ( $n=49$ ) who had CBCL data available, correlations were calculated for the CBCL Internalizing, Externalizing, and Total scores with both the original Vineland-II maladaptive sections (Table 20) and scales based on the new factors (Table 21). The original Vineland-II Internalizing scale was most strongly correlated with the CBCL Internalizing scale, as expected. The Vineland-II Externalizing scale was most strongly correlated with the CBCL Externalizing scale, but was also

moderately correlated with CBCL Internalizing. The Vineland-II Maladaptive Behavior Index (overall score) was most strongly correlated with the CBCL Total.

Table 20. *Correlations among original Vineland maladaptive behaviour and CBCL scales*

	Internalizing ( <i>n</i> = 49)	Externalizing ( <i>n</i> = 49)	Other ( <i>n</i> = 49)	Critical ( <i>n</i> = 47)	MBI ( <i>n</i> = 49)
CBCL	.47**	.47**	.23	.41**	.50**
Internalizing					
CBCL	.31*	.65**	.42**	.43**	.56**
Externalizing					
CBCL Total	.46**	.61**	.39**	.52**	.59**

\*  $p < .05$  (2-tailed). \*\*  $p < .01$  (2-tailed). MBI = Maladaptive Behavior Index, CBCL = Childhood Behavior Checklist.

When considering scales based on the new Vineland-II factors, all of the correlations that reached a significant level were in a positive direction. The Factor 1 scale, “Acting Out,” was most strongly related to the CBCL Externalizing scale, as would be expected, though also moderately correlated with Internalizing. Factors 2, “Social Regulation,” and 3, “ASD,” were not significantly correlated with any of the CBCL scales. Factor 4, “Emotion Regulation,” was strongly related to all three CBCL scales. Factor 5, “Socially Inappropriate,” had strong correlations to CBCL Externalizing and

CBCL Total scales. Factor 5 also had a medium strength relationship with the CBCL Internalizing scale. Factor 6, “Self-Regulation,” had a medium strength relationship with the CBCL Internalizing scale and the CBCL Total scale.

Table 21. *Correlations among new factors and CBCL scales*

	Factor 1 ( <i>n</i> = 48)	Factor 2 ( <i>n</i> = 47)	Factor 3 ( <i>n</i> = 47)	Factor 4 ( <i>n</i> = 46)	Factor 5 ( <i>n</i> = 47)	Factor 6 ( <i>n</i> = 49)
CBCL Internalizing	.49**	.07	.15	.58**	.41**	.29*
CBCL Externalizing	.73**	-.17	.11	.62**	.66**	.23
CBCL Total	.69**	.09	.21	.68**	.59**	.37**

Note. \*  $p < .05$  (2-tailed). \*\*  $p < .01$  (2-tailed). CBCL = Childhood Behavior Checklist.

## Discussion

The Vineland Adaptive Behavior Scales – Second Edition (Vineland-II) is one of the most widely used measures of adaptive behaviour (Sparrow et al., 2005). The utility of the adaptive behaviour component of the Vineland-II has been examined extensively, but the maladaptive domain has been overlooked in the literature. The present study analyzed the utility of the Maladaptive Behavior Index of the Vineland-II as a screening tool for psychopathology and maladaptive behaviour in a sample of individuals with autism spectrum disorders (ASD) and intellectual disability. Using various other measures, previous studies have consistently found elevated levels of emotional and behavioural problems in individuals with ASD. No previous studies using the Vineland-II

maladaptive scales could be found, suggesting that the present study is the first examination of the Maladaptive Behavior Domain of the Vineland-II. The Maladaptive Behavior Domain is in wide use with individuals with intellectual disability or ASD. Thus, it has the potential to be an extremely valuable source of information regarding the challenging behaviours within this population. However, if the Maladaptive Domain of the Vineland-II is not a valid measure of emotional and behavioural problems in this population, there is great potential for misunderstanding, mistreatment, and misdiagnosis.

In the present study, exploratory factor analysis was used to reorganize the maladaptive domain items for use with this population. Associations were examined between both the original scales and scales based on the resultant factors and participant characteristics. The patterns of correlations using the four original Vineland-II maladaptive scales (Internalizing, Externalizing, Other, and Critical Items) are difficult to interpret. The original scales of the Maladaptive Behavior Domain were all positively correlated with age and severity of ASD. For the most part, the original scales were negatively correlated with measures of cognition and adaptive behaviour to a small to medium degree. The Externalizing scale was a partial exception. The association between this original scale and cognitive skills was essentially zero. Overall, the scores from the Vineland-II maladaptive section suggest that participants who are younger, less severely affected with ASD, and have higher skill levels display fewer maladaptive behaviours.

One of the reasons that the scores on the Maladaptive Behavior Domain are difficult to understand is because of the construction of the individual scales. The Other and Critical Items scales, in particular, are not theoretically or empirically coherent. Neither scale is built around any particular psychological or behavioural construct. The

authors of the Vineland-II provide no rationale or information on the construction and development of the Other or Critical Items scales. They appear to be simply a collection of individual concerning behaviours. Because they are not built around any known construct nor, to our knowledge, based on factor analytic procedures. A high score on the Other or Critical Items scale does not suggest any particular underlying disorder or problem and is not suggestive of any potential treatment or intervention. The construction of these scales seriously limits the clinical utility of the maladaptive section.

On the other hand, the Internalizing and Externalizing scales of the Vineland-II are built upon the well-known and commonly used concept that symptoms of psychopathology may be directed inward or outward from the affected individual. For instance, depression and anxiety are often considered internalizing disorders whereas Oppositional Defiant Disorder (ODD) is considered an externalizing disorder. Internalizing and externalizing scales are found on many measures of pathological behaviour. However, the way that internalizing behaviour is conceptualized in the general population is likely not appropriate for use in individuals with ASD and intellectual disability (Kishore, Nizamie & Nizamie, 2005). Many scales that are purported to examine internalizing behaviour typically contain items that are confounded with symptoms of ASD. For instance, on the Internalizing scale of the Vineland-II, items such as “Avoids others and prefers to be alone”, “Has poor eye contact”, and “Avoids social interaction” are also common features of ASD. In fact, these items relate to some of the core features of ASD. When looking at internalizing problems within the ASD population, such items should be removed from consideration or perhaps modified to be more specific. When measured within the internalizing category, these features may



incorrectly scored as representing an internalizing disorder when in actuality they may simply be features of ASD. Given the common use of such items, it is not surprising that several studies have found high internalizing scores for individuals with ASD (e.g. Bradley et al., 2004; Pearson et al., 2006; Skokauskas & Gallagher, 2012). In fact, the Vineland-II manual reports higher scores on the Internalizing subscale of the Maladaptive Behavior Domain for a sample of individuals with ASD compared to a non-clinical matched sample (Sparrow et al., 2005). It is, of course, possible that a given symptom may be related to multiple disorders. It is difficult to interpret high scores on an internalizing scale for individuals with ASD. The scores may be elevated due to symptoms of ASD. However, individuals with ASD also do experience internalizing disorders and the scores may be elevated due to internalizing symptoms. It is also possible for a symptom to stem from both ASD and internalizing disorders. An important area for future study is to examine symptoms of internalizing disorders within ASD populations and to build scales upon symptoms that are more specifically attributable to the internalizing disorder and separate from ASD.

In general, the results of the present study do not support the use of the Vineland-II maladaptive scales as composite measures of psychopathology for individuals with ASD and intellectual disabilities. The Other and Critical Items scales have no well-defined underlying construct and the use of the internalizing construct is suspect for individuals with ASD and intellectual disability. However, although the structure of the Maladaptive Behavior Domain of the Vineland-II may not be appropriate as a composite measure for use with individuals with ASD and intellectual disability, many of the individual items within this scale do have clinical value. By realigning the existing items

into scales that are more relevant and meaningful for this population, clinicians may be able to increase the utility of the Maladaptive Behavior Domain.

The factor analysis performed with the items of the Maladaptive Behavior Domain restructured the items into six factors which bear little resemblance to the original Vineland-II scales overall. The exception to this was Factor 1, “Acting Out”, which was defined by nine items, eight of which come from the Vineland-II Externalizing scale (see Table 11). This suggests that acting out or externalizing behaviours are a valid conceptualization of some maladaptive behaviours in ASD and intellectual disability. The Acting Out scale based on this factor is essentially uncorrelated with ASD symptoms and cognitive skills. The Acting Out scale had a small to medium association with age and a small negative relationship with adaptive skills. Individuals who score high on the Acting Out scale may benefit from interventions that target their adaptive skills. The other five scales resulting from the factor analysis were markedly dissimilar from the original Vineland-II scales.

Two factors, Emotion Regulation (Factor 4) and Self-Regulation (Factor 6), may be particularly valuable for examining anxiety or depression within individuals with intellectual disability and ASD. Several items within the Emotion Regulation scale directly query emotional concerns (e.g. “Is overly anxious or nervous”, “Is unusually fearful of ordinary sounds, objects, or situations”, and “Is sad for no clear reason”). Other items within this scale have been reported to be associated with emotional concerns within individuals with ASD (e.g. “Has sleep difficulties” and “Displays behaviors that cause injury to self”; Helverschou et al., 2011). Similarly, the Self-Regulation scale is composed of items that may suggest emotional concerns within individuals with ASD

and intellectual disability (e.g. “Has eating difficulties” and “Grinds teeth during the day or the night”). However, several items within this scale, although they may be related to emotional concerns, may also represent behaviours related to level of intellectual disability (e.g. “Wets bed or must wear diapers at night”) or ASD (e.g., “Has poor eye contact”). A potentially valuable use for the Self-Regulation scale is to monitor behaviour over time as increases in an individual’s score on this scale may signal emotional concerns. None of the items within either the Emotion Regulation or Self-Regulation scale involves a verbal component, which allows these scales to be extremely useful for individuals who are nonverbal. The absence of any items with a verbal component is critical for the accurate evaluation of psychopathology in nonverbal individuals who are at increased risk of psychopathology (de Ruiter et al., 2007; Koskentausta et al., 2007). Scales composed of clearly observable behaviour are important for the identification of psychopathology in this at risk group.

The relationship between the participant characteristics and the newly developed scales based on the six factors suggest that they are more suitable for this population than the original Vineland-II scales and provide scores that will have greater clinical utility. The correlations of the new scales with age and severity of ASD were mostly small to medium strength (see Table 17). In general, older participants and those with more symptoms of ASD display more signs of psychopathology. The Socially Inappropriate scale (Factor 5) had the strongest association with age. The ASD (Factor 3) and Self-Regulation (Factor 6) scales were the most strongly linked to ASD severity. However, the ASD scale was only moderately correlated with severity of autism on the CARS. This relationship may be weaker than expected because the measure upon which the severity

of ASD score was based, the CARS, is a more comprehensive measure of ASD, and includes items measuring sensory sensitivities, repetitive behaviour patterns, and communication skills. The ASD scale consists mainly of items that are social in nature (e.g. “Avoids other and prefers to be alone”, “Avoids social interaction”, and “Consistently prefers objects to people”).

Although some of these results are similar to the pattern of correlations found for the original Vineland-II scales with age and severity of ASD, there are several important differences. The Self-Regulation scale differed from the other scales by virtue of having essentially no relationship with age. The Acting Out, Social Regulation, ASD, Emotion Regulation, and Socially Inappropriate scales all had small to medium positive correlations with age. The Self-Regulation scale (Factor 6) is composed of seven items, several of which (i.e. “Eating difficulties”, “Sleep difficulties”, and “Wets the bed”) are frequently a focus of intervention in early childhood. Higher scores on this scale may be related to emotional distress.

The Social Regulation scale (Factor 2) was also the only scale to have a negative relationship with severity of autism. Problems of Social Regulation were lower for those participants more severely affected by ASD. The Social Regulation scale is made up of items which involve the ability to regulate behaviour that is social in nature (e.g. “Lies, cheats, or steals”, “Behaves inappropriately at the urging of others”, and “Says embarrassing things or asks embarrassing questions in public”). Although one may expect that Social Regulation difficulties would increase along with severity of ASD, a certain minimum level of social opportunity, social awareness, and theory of mind would be needed for these items to be endorsed. Older individuals with severe cognitive

impairments and ASD likely do not have the opportunity to display the social behaviours found in the Social Regulation scale (e.g., “Lies, cheats, or steals” or “Behaves inappropriately at the urging of others”). Additionally, many of the items in the Social Regulation scale are verbal in nature and, therefore, would not apply to individuals who are nonverbal or who have limited verbal skills.

The majority of the associations between the new scales and cognitive and adaptive skills were negative and in the medium range (see Tables 18 and 19). Participants with higher cognitive and adaptive skills generally displayed less maladaptive behaviour. The Socially Inappropriate scale (Factor 5) tended to have the strongest negative relationships with cognitive and adaptive skills. The Acting Out scale (Factor 1) had the weakest negative relationship with cognitive and adaptive skills. The Acting Out scale had no significant relationship with cognitive skills and a small negative relationship with adaptive skills.

The Social Regulation scale (Factor 2) had a different association with adaptive skills than did the other scales. The association between Social Regulation and all measures of adaptive behaviour were in the small range. The association between Social Regulation and cognition were positive and of medium strength. This pattern likely reflects individuals with higher cognitive and adaptive skills having increased opportunity for social interaction. Additionally, as already noted, many of the items in the Social Regulation scale require verbal skills (e.g. “Says embarrassing things...in public”, “Swears”, “Expresses thoughts that do not make sense”, etc.) indicating that a certain level of communication ability is necessary for the endorsement of these items. In fact, the Social Regulation scale had a medium strength positive association with Verbal IQ.

## **Clinical Implications**

This study adds to the clinical utility of the Vineland-II for individuals with ASD and intellectual disability. All previous research has focused on the use of the adaptive behaviour component of the Vineland-II. This study is the first to examine the Maladaptive Behavior Domain. Use of the Vineland-II is common in clinical practice in the ASD and intellectual disability fields. However, that use seems to have been largely restricted to the adaptive behaviour sections. Reorganization of the Maladaptive Behavior Domain will allow for improved identification of psychopathology in this population and greater use of the Vineland-II in clinical practice. The scales based on the factors that have emerged from the present study are an improvement over the original subscales within the Maladaptive Behavior Domain because the original subscales (Internalizing, Externalizing, Other, and Critical Items) do not measure well-defined constructs, nor are they empirically validated, particularly within the ASD and intellectual disability populations. Understanding an individual's scores on the original Vineland-II is therefore very difficult because one is not sure which underlying characteristic may be elevated (e.g., if an individual with ASD has an elevated Internalizing score, it is unclear if the score is elevated because of true internalizing symptoms or if it is elevated because of symptoms of ASD).

The exploratory factor analysis of the Maladaptive Behavior Domain of the Vineland-II is the first step towards improving the utility of this section to detect different forms of psychopathology in individuals with ASD and intellectual disability. Future research is required to continue to evaluate the Maladaptive Behavior Domain. Further analyses are needed to develop the scales. The development of cut-off scores and norms

for the scales is a logical next step. Separate analyses and scale development for children, adolescents, and adults are also potentially fertile areas for study. Separate analyses for different levels of intellectual disability (i.e. mild, moderate, severe, and profound) would also be valuable.

Each of the six newly defined scales is much more unitary in nature than the original Maladaptive scales, and is therefore easier to interpret and understand. Further research will be required to develop norms and scoring procedures. It will be important to compare the new scales to other, well-established measures that assess similar constructs and that have been developed specifically for individuals with ASD. Presently, the scales may be used to monitor the behaviour of individuals with ASD and intellectual disability over time. Increases in scores on any of the scales may indicate emerging difficulties in that area. These specific behaviours may then be investigated and targeted for intervention.

The individual scales may be administered based on the specific profile of the individual being assessed. For instance, if the individual is nonverbal, the clinician may choose not to administer the Social Regulation items, as the items within this scale are largely verbal in nature and therefore not relevant. The Emotion Regulation and Self-Regulation scales are very valuable for use with individuals who are nonverbal or who otherwise have difficulty expressing themselves verbally.

### **Limitations**

The limitations of this study include the clinical nature of the sample. Data used in this study were gathered from clinical psychological assessments that were a component

of each participant's treatment process. The levels of psychological symptoms may be artificially high due to this referral bias, although children were not referred because of maladaptive behavior per se. Additionally, because some individual items were used in more than one factor, the correlations using the scales based on the new factors may be artificially inflated.

Sample size is also a limitation of this study. Although large for such a clinical population, the size of the sample is somewhat small for a factor analysis. A larger number of participants would have allowed for separate analyses for age groups and cognitive levels, which would be informative as factor structure could differ in different subgroups (Shuster, Perry, Bebko, & Toplak, 2014).

The participants in this study ranged from preschool age to adulthood. While it is critical to examine the psychosocial needs of individuals with intellectual disabilities and ASD across the lifespan, it is possible, and in fact likely, that patterns of maladaptive behaviour are different at life's different stages. These limitations undoubtedly impact the generalizability of the results of this study.

### **Strengths**

Most research on psychopathology in ASD and intellectual disabilities has not examined the content of the scales used, making this study somewhat unique. Using measures designed for and normed on the general population with individuals with ASD and intellectual disability will lead to inaccurate results. Such measures, including the Maladaptive Behavior Domain on the Vineland-II that was used here, cannot generalize



to use with ASD and intellectual disability populations without first examining how these measures apply to the population.

Although the limited cognitive range of participants in the present study limits the ability to generalize the results, very few studies have focused on individuals with severe and profound cognitive impairments, making this study an important contribution to the literature. Those with more severe cognitive disabilities have historically been neglected in examinations of psychopathology largely because of measurement issues.

Mental health in individuals with ASD and intellectual disability is a relatively new field of study. Measuring and identifying psychopathology can be an extremely challenging process in individuals who have ASD and intellectual disability. However, the importance of accurately identifying the mental health needs in this population has recently begun to garner attention. There are very few widely used or well-validated measures of psychopathology for use in this population. By attempting to improve the Maladaptive Behavior Domain of the Vineland-II this study is a much needed addition to the sparse literature. Ultimately, identification of psychopathology is critical for the application of appropriate interventions, to relieve distress, and to improve the quality of life of the individuals and those around them. If clinicians are able to apply an appropriate and accurate screening tool in the course of clinical practice, further assessment and suitable treatment may be implemented more quickly.

## References

- Achenbach, T.M., & Rescorla, L.A. (2001). *Manual for ASEBA school-age forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.
- Allen, D. (2008). The relationship between challenging behaviour and mental ill-health in people with intellectual disabilities: A review of current theories and evidence. *Journal of Intellectual Disabilities, 12*, 267 – 294.
- Aman, M. G., & Singh, N. N. (1986). *Aberrant behavior checklist: Manual*. East Aurora, NY: Slosson Educational Publications.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: 4th ed., text revision*. Washington, DC: Author.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: 5th ed.* Washington, DC: Author.
- Anderson, D. K., Maye, M. P., & Lord, C. (2011). Changes in maladaptive behaviors from midchildhood to young adulthood in autism spectrum disorder. *American Association on Intellectual and Developmental Disabilities, 116*, 381 – 397.
- Bradley, E. A., Summers, J. A., Wood, H. L., & Bryson, S. E. (2004). Comparing rates of psychiatric and behavior disorders in adolescents and young adults with severe intellectual disability with and without autism. *Journal of Autism and Developmental Disorders, 34*, 151 – 161.
- Brereton, A. V., Tonge, B. J., & Einfeld, S. L. (2006). Psychopathology in children and adolescents with autism compared to young people with intellectual disability. *Journal of Autism and Developmental Disorders, 36*, 863 – 870.

- Bruininks, R.H., Woodcock, R.W., Weatherman, R.F., & Hill, B.K. (1996). *Scales of Independent Behavior-Revised*. Itasca IL: Riverside Publishing.
- Bryson, S. A., Corrigan, S. K., McDonald, T. P., Holmes, C. (2008). Characteristics of children with autism spectrum disorders who received services through community mental health centers. *Autism, 12*, 65 – 82.
- Chadwick, O., Kusel, Y., & Cuddy, M. (2008). Factors associated with the risk of behaviour problems in adolescents with severe intellectual disabilities. *Journal of Intellectual Disability Research, 52*, 864 – 876.
- Chadwick, O., Kusel, Y., Cuddy, M., & Taylor, E. (2005). Psychiatric diagnoses and behaviour problems from childhood to early adolescence in young people with severe intellectual disabilities. *Psychological Medicine, 35*, 751 – 760.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155 – 159.
- Cooper, S. A., Smiley, E., Finlayson, J., Jackson, A., Allan, L., Williamson, A., et al. (2007). The prevalence, incidence, and factors predictive of mental ill-health in adults with profound intellectual disabilities. *Journal of Applied Research in Intellectual Disabilities, 20*, 493 – 501.
- Cronbach, J. L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297 – 334.
- de Ruiter, K. P., Dekker, M. C., Verhulst, F. C., & Koot, H. M. (2007). Developmental course of psychopathology in youths with and without intellectual disabilities. *Journal of Child Psychology and Psychiatry, 48*, 498 – 507.
- Dykens, E. M. (2000). Annotation: Psychopathology in children with intellectual disability. *Journal of Child Psychology and Psychiatry, 41*, 407 – 417.

- Einfeld, S. L., Ellis, L. A., & Emerson, E. (2011). Comorbidity of intellectual disability and mental disorder in children and adolescents: A systematic review. *Journal of Intellectual and Developmental Disability, 36*, 137 – 143.
- Einfeld, S. L., Piccinin, A. M., Mackinnon, A., Hofer, S. M., Taffe, J., Gray, K. M., et al. (2006). Psychopathology in young people with intellectual disability. *Journal of the American Medical Association, 296*, 1981 – 1989.
- Einfeld, S. L., & Tonge, B. J. (1995). The developmental behaviour checklist: The development and validation of an instrument to assess behavioural and emotional disturbance in children and adolescents with mental retardation. *Journal of Autism and Developmental Disorders, 25*, 81 – 104.
- Emerson, E. & Hatton, C. (2007). Mental health of children and adolescents with intellectual disabilities in Britain. *British Journal of Psychiatry, 191*, 493 – 499.
- Fitzgerald, M. E., Matson, J. L., & Barker, A. (2011). Symptoms of psychopathology in adults with intellectual disability and seizures. *Research in Developmental Disabilities, 32*, 2263 – 2266.
- Fletcher, R., Loschen, E., Stavrakaki, C., & First, M. (2007). Diagnostic manual – intellectual disability: A textbook of diagnosis of mental disorders in persons with intellectual disability. New York, NY: National Association for the Dually Diagnosed.
- Forster, S., Gray, K. M., Taffe, J., Einfeld, S. L., & Tonge, B. J. (2011). Behavioural and emotional problems in people with severe and profound intellectual disability. *Journal of Intellectual Disability Research, 55*, 190 – 198.

- Gjevik E., Eldevik, S., Fjaeran-Granum, T., & Sponheim, E. (2011). Kiddie-SADS reveals high rates of DSM-IV disorders in children and adolescents with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 41*, 761 – 769.
- Hayes, S., McGuire, B., O'Neill, M., Oliver, C., & Morrison, T. (2011). Low mood and challenging behaviour in people with severe and profound intellectual disabilities. *Journal of Intellectual Disability Research, 55*, 182 – 189.
- Helverschou, S. B., Bakken, T. L., & Martinsen, H. (2011). Psychiatric disorders in people with autism spectrum disorders: Phenomenology and recognition. In J.L. Matson & P. Sturmey (Eds.), *International handbook of autism and pervasive developmental disorders* (pp. 53 – 74). New York, NY: Springer.
- Hofvander, B., Delorme, R., Chaste, P., Nyden, A., Wentz, E., Stahlberg, O.,... Leboyer, M. (2009). Psychiatric and psychosocial problems in adults with normal-intelligence autism spectrum disorders. *BMC Psychiatry, 9*, 35 – 44.
- Hove, O. & Havik, O. E. (2008). Psychometric properties of psychopathology checklists for adults with intellectual disability (P-AID) on a community sample of adults with intellectual disability. *Research in Developmental Disabilities, 29*, 467 – 482.
- Hove, O. & Havik, O. E. (2010). Developmental level and other factors associated with symptoms of mental disorders and problem behaviour in adults with intellectual disabilities living in the community. *Social Psychiatry and Psychiatric Epidemiology, 45*, 105 – 113.
- Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., et al. (1997). Schedule for affective disorders and schizophrenia for school-age children-present

and lifetime version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 980–988.

Kishore, M. T., Nizamie, S. H., & Nizamie, A. (2005). The behavioural profile of psychiatric disorders in persons with intellectual disability. *Journal of Intellectual Disability Research*, 49, 852 – 857.

Kolaitis, G. (2008). Young people with intellectual disabilities and mental health needs. *Current Opinions in Psychiatry*, 21, 469 – 473.

Koskentausta, T., Iivanainen, M., & Almqvist, F. (2007). Risk factors for psychiatric disturbance in children with intellectual disability. *Journal of Intellectual Disability Research*, 51, 43 – 53.

Kraemer, H. C., Morgan, G. C., Leech, N. L., Gliner, J. A., Vaske, J. J., & Harmon, R. J. (2003). Measures of clinical significance. *Journal of the American Academy of Child and Adolescent Psychiatry*, 42, 1524 – 1529.

Lambert, N., Nihira, K., & Leland, H. (1993). *AAMR Adaptive Behavior Scale-School* (2<sup>nd</sup> ed.). Austin, TX: American Association on Mental Retardation.

Leyfer, O. T., Folstein, S. E., Bacalman, S., Davis, N. O., Dinh, E., Morgan, J., et al. (2006). Comorbid psychiatric disorders in children with autism: Interview development and rates of disorders. *Journal of Autism and Developmental Disorders*, 36, 849 – 861.

Lundstrom, S., Chang, Z., Kerekes, N., Gumpert, C. H., Rastam, M., Gillberg, C., & Anckarsater, H. (2011). Autistic-like traits and their association with mental health problems in two nationwide twin cohorts of children and adults. *Psychological Medicine*, 41, 2423 – 2433.

- Matson, J. L. (1995). *The diagnostic assessment for the severely handicapped – revised (DASH-II)*. Baton Rouge, LA: Scientific Publishers.
- Matson, J. L. & Bamburg, J. W. (1998). Reliability of the assessment of dual diagnosis (ADD). *Research in Developmental Disabilities, 19*, 89 – 95.
- Matson, J. L. & Gonzalez, M. L. (2007). *Autism Spectrum Disorders – comorbidity – child version*. Baton Rouge, LA: Disability Consultants LLC.
- Matson, J. L., LoVullo, S. V., Rivet, T. T., & Boisjoli, J. A. (2009). Validity of the autism spectrum disorder – comorbid for children (ASD-CC). *Research in Autism Spectrum Disorders, 3*, 345 – 357.
- Mayes, S. D. & Calhoun, S. L. (2007). Wechsler intelligence scale for children – third and – fourth edition predictors of academic achievement in children with attention-deficit/hyperactivity disorder. *School Psychology Quarterly, 22*, 234 – 249.
- McCarthy, J., Hemmings, C., Kravariti, E., Dworzynski, K., Holt, G., Bouras, N., & Tsakanikos, E. (2010). Challenging behavior and co-morbid psychopathology in adults with intellectual disability and autism spectrum disorders. *Research in Developmental Disabilities, 31*, 362 – 366.
- 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.
- Melville, C. A., Cooper, S-A., Morrison, J., Smiley, E., Allan, L., Jackson, A., et al. (2008). The prevalence and incidence of mental ill-health in adults with autism and intellectual disabilities. *Journal of Autism and Developmental Disorders, 38*, 1676 – 1688.

- Minaya, O. & Fresan, A. (2009). Anxiety disorders comorbidity in first-episode depressed patients: Personality differences based on the temperament and character inventory. *Personality and Individual Differences, 47*, 522 – 526.
- Morgan, V. A., Leonard, H., Bourke, J., & Jablensky, A. (2008). Intellectual disability co-occurring with schizophrenia and other psychiatric illness: population-based study. *The British Journal of Psychiatry, 193*, 364 – 372.
- Moseley, D. S., Tonge, B. J., Brereton, A. V., & Einfeld, S. L. (2011). Psychiatric comorbidity in adolescents and young adults with autism. *Journal of Mental Health Research in Intellectual Disabilities, 4*, 299 – 243.
- Moss, S., Prosser, H., Costello, H., Simpson, N., Patel, P., Rowe, S., et al. (1998). Reliability and validity of the PAS-ADD checklist for detecting psychiatric disorders in adults with intellectual disability. *Journal of Intellectual Disability Research, 42*, 173 – 183.
- Mullen, E. M. (1995). *Mullen Scales of Early Learning*. Circle Pines, MN: American Guidance Service, Inc.
- Myrbakk, E. & von Tetzchner, S. (2008). Psychiatric disorders and behaviour problems in people with intellectual disability. *Research in Developmental Disabilities, 29*, 316 – 332.
- O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instruments, & Computers, 32*, 396 – 402.



- Pandolfi, V., Magyar, C. I., & Dill, C. A. (2011). An initial psychometric evaluation of the CBCL 6–18 in a sample of youth with autism spectrum disorders. *Research in Autism Spectrum Disorders, 6*, 96 – 108.
- Pearson, D. A., Loveland, K. A., Lachar, D., Lane, D. M., Reddoch, S. L., Mansour, R., et al. (2006). A comparison of behavioral and emotional functioning in children and adolescents with Autistic Disorder and PDD-NOS. *Child Neuropsychology, 12*, 321 – 333.
- Perry, A., Condillac, R. A., Freeman, N. L. (2002). Best practices and practical strategies for assessment and diagnosis of autism. *Journal on Developmental Disabilities, 9*, 61 – 75.
- Perry, A., Loh, A., Carter, M., Dunlap, G., Black, A., & Wells, K. (2011). Autism and related disabilities. In I. Brown & M. Percy (Eds.). *Developmental disabilities in Ontario* (pp. 305 – 327). Toronto, Canada: Ontario Association on Developmental Disabilities.
- Preacher, K. J. & MacCallum, R. C. (2003). Repairing Tom Swift's electric factor analysis machine. *Understanding Statistics, 2*, 13 – 43.
- Prosser, H., Moss, S., Costello, H., Simpson, N., & Patel, P. (1997). *The mini PAS-ADD: An assessment schedule for the detection of mental health needs in adults with learning disability (mental retardation)*. Manchester, UK: Hester Adrian Research Centre, University of Manchester.
- Reiss, S. (1988). *Test manual for the Reiss Screen for maladaptive behavior*. Orlando Park, IL: International Diagnostic Systems.

- Reiss, S., Levitan, G. W., & Szysko, J. (1982). Emotional disturbance and mental retardation: Diagnostic overshadowing. *American Journal of Mental Deficiency, 86*, 567 – 574.
- Roid, G. H. (2003). *Stanford-Binet Intelligence Scales*, (5<sup>th</sup> ed.). Itasca, IL: Riverside.
- Ross, E., & Oliver, C. (2003). The relationship between levels of mood, interest, and pleasure and challenging behaviour in adults with severe and profound intellectual disability. *Journal of Intellectual Disability Research, 42*, 81 – 93.
- Schopler, E., Reichler, R.J., & Renner, B.R. (1988). *The Childhood Autism Rating Scale (CARS)*. Los Angeles: Western Psychological Services.
- Sloane, M., Durrheim, K., Kaminer, D., & Lachman, P. (1999). Issues in the identification of comorbidity of mental retardation and psychopathology in a multicultural context. *Social Psychiatry and Psychiatric Epidemiology, 34*, 190 – 194.
- Skokauskas, N. & Gallagher, L. (2012). Mental health aspects of autistic spectrum disorders in children. *Journal of Intellectual Disability Research, 56*, 248 – 257.
- Solomon, M., Miller, M., Tayler, S. L., Hinshaw, S. P., & Carter, C. S. (2012). Autism symptoms and internalizing psychopathology in girls and boys with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*, 48 – 59.
- Sparrow, S. S., Cicchetti, D. V., & Balla, D. A. (2005). *Vineland Adaptive Behavior Scales* (2<sup>nd</sup> ed.). Circle Pines, MN: American Guidance Service.
- Streiner, D. L. (2003). Starting at the beginning: An introduction to coefficient alpha and internal consistency. *Journal of Personality Assessment, 80*, 99 – 103.

- Summers, J., Bradley, E., & Flannery, J. (2011). Developmental disabilities and mental ill-health. In I. Brown & M. Percy (Eds.), *Developmental disabilities in Ontario* (3<sup>rd</sup> Ed., pp. 641 – 670). Toronto, ON: Ontario Association on Developmental Disabilities.
- Tsakanikos, E., Costello, H., Holt, G., Bouras, N., Sturmey, P., & Newton, T. (2006). Psychopathology in adults with autism and intellectual disability. *Journal of Autism and Developmental Disorders*, *36*, 1123 – 1129.
- Underwood, L., McCarthy, J., & Tsakanikos, E. (2011). Assessment of Comorbid Psychopathology. In J. L. Matson & P. Sturmey (Eds.), *International handbook of autism and pervasive developmental disorders*. (pp. 287 – 293). New York: Springer.
- Wallander, J. L., Dekker, M. C., & Koot, H. M. (2006). Risk factors for psychopathology in children with intellectual disability: A prospective longitudinal population-based study. *Journal of Intellectual Disability Research*, *50*, 259 – 268.
- Wells, K., Perry, A., Levy, A., & Luthra, N. (2009, April). *The Vineland Adaptive Behavior Scales – 2<sup>nd</sup> Edition as a measure of maladaptive behaviour in autism*. Poster presented at the Ontario Association on Developmental Disabilities Conference, Barrie, Ontario.
- Whitaker, S. & Read, S. (2006). The prevalence of psychiatric disorders among people with intellectual disabilities: An analysis of the literature. *Journal of Applied Research in Intellectual Disabilities*, *19*, 330 – 345.

Wirt, R. D., Lachar, D., Klinedinst, J. K., & Seat, P. D. (1984). *Multidimensional description of child personality: A manual for the personality inventory for children* (Rev. ed.). Los Angeles: Western Psychological Services.

World Health Organization. (1978). *International Statistical Classification of Diseases and Related Health Problems* (9th Rev.) (ICD-9). Geneva: Author.