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# Comparing Rates of Psychiatric and Behavior Disorders in Adolescents and Young Adults with Severe Intellectual Disability with and without Autism

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Eight males and four females with an Autism Diagnostic Interview-Revised (ADI-R) diagnosis of autism (mean age of 16.3 years) and severe intellectual disability (IQ < 40) were individually matched to controls on the basis of chronological age, gender, and nonverbal IQ. The dependent measure was the Diagnostic Assessment for the Severely Handicapped-II, which is used to screen for psychiatric and behavior disorders in lower-functioning individuals. Participants with autism showed significantly greater disturbances as measured by the Diagnostic Assessment for the Severely Handicapped-II total score and seven of 13 subscales. They also averaged 5.25 clinically significant disturbances compared with 1.25 disturbances for participants without autism. Specific vulnerabilities to anxiety, mood, sleep, organic syndromes, and stereotypies/tics were found in the participants with comorbid autism.

**KEY WORDS:** Autism; intellectual disability; adolescence; behavior and psychiatric disorders.

## INTRODUCTION

One of the most consistent findings to emerge in recent years is the increased prevalence of psychiatric and behavior disorders among individuals with intellectual disability[6] compared with the general population. It has been estimated that anywhere from 10% to 70% of individuals present with such behavioral or psychiatric disturbance (Bregman, 1991). The variability in findings can be understood as an interaction among several factors, including the characteristics of the individuals being evaluated (e.g., their level of intellectual disability, age, gender, medical or genetic conditions, family history), their living arrangements (e.g., community settings, clinical or institutional settings), the sampling methods used in the study (e.g., population-based approaches, clinic referrals), and the clinical criteria (psychiatric disorders only vs. psychiatric, behavioral, or emotional disorders) and assessment approaches (e.g., semistructured clinical interviews, file reviews, observations, rating scales) that were used for ascertainment and diagnosis (Borthwick-Duffy, 1994).

There is tremendous diversity among individuals with intellectual disability in terms of functioning level, etiology of disabilities, and other variables likely to affect mental health. Existing prevalence data pertain largely to undifferentiated populations in terms of these variables. There is a growing trend, however, for researchers to study mental health disorders within smaller, more homogeneous subgroups. Recent advances in the field of genetics have paved the way for the identification of psychiatric and behavioral

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[6] The term "intellectual disability" is used synonymously with mental retardation as defined in *Diagnostic and Statistical Manual* (4th ed.) (DSM-IV; American Psychiatric Association, 1994).



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phenotypes in groups of individuals with a genetic etiology for their intellectual disability. As a result, there is mounting evidence that some syndromes (e.g., Down, Williams, Prader-Willi, Deletion 22q11.2, and Fragile X) are associated with different rates and patterns of, as well as vulnerabilities to, mental health disorders (Dykens, Hodapp, & Finucane, 2000). More discoveries of this type will help bring greater clarity and specificity to the prevalence statistics.

Autism and autism spectrum disorders make up one of the largest diagnostic subgroups within the entire population of individuals with intellectual disability (Nordin & Gillberg, 1996; Stromme & Diseth, 2000). Autism is a behaviorally defined syndrome that is characterized by abnormalities or impairments in the areas of communication and play, socialization, and range of interests and activities, all with an onset before 3 years of age (DSM-IV; American Psychiatric Association, 1994). More rigorous diagnostic tools are now available (Autism Diagnostic Observation Schedule; Lord *et al.,* 2000; Autism Diagnostic Interview-Revised; Lord, Rutter, & Le Couteur, 1994), permitting greater precision in defining who meets these social, communication, and behavioral criteria across chronological age and level of functioning, and thus providing a more homogenous group in which to explore mental health issues. An important question is whether a diagnosis of autism is associated with higher rates of psychiatric and behavior disorder, a finding that, if substantiated, would have important implications for the planning and delivery of effective treatment and allocation of limited resources (Bryson, 1996) and would also raise the issue as to why those with autism are more vulnerable to such disturbances. Studies of comorbid mental health disorders among individuals with autism/PDD are few (e.g., Lainhart & Folstein, 1994; Tsai, 1996) and often focus on the minority of higher-functioning, verbal individuals (e.g., Ghaziuddin, Alessi, & Greden, 1995; Kim, Szatmari, Bryson, Streiner, & Wilson, 2000), who are most likely to be able to report their symptoms. By contrast, there is an enormous literature on the assessment and treatment of behavioral deficits (e.g., communication, social, and play skills) and excesses (e.g., aggression, self-injury, stereotypies) in individuals with autism or autistic-like behavior (see Matson, Benavidez, Compton, Paclawskyj, & Baglio, 1996b, for a review of over 250 studies in this area), many of whom also have severe intellectual disability and minimal or poor verbal skills. Because behavioral approaches tend to deemphasize diagnostic and etiological issues, even less is known about the prevalence of psychiatric disorder in this subset of individuals with autism who also have severe intellectual disability, although there has been increasing attention to these issues in recent years (Brereton & Tonge, 2001).

Diagnosing psychiatric and behavior disorders in persons with severe cognitive and communicative impairments such as those with intellectual disability and autism poses formidable challenges (King, DeAntonio, McCracken, Forness, & Ackerland, 1994). Existing diagnostic classificatory systems (DSM-IV, American Psychiatric Association, 1994; ICD-10-CDDG, World Health Organization, 1992) rely heavily on descriptions of the subjective experiences of the individuals who are being diagnosed. Applying these diagnostic approaches to persons who are unable to share their subjective experiences because of cognitive and communication impairments and disabilities is problematic, and some would argue that an alternative conceptualization for diagnosing mental health disorders is needed for this severely impaired group (e.g., Reid, 1980). At present, attempts are being made to modify these existing systems so that they can be more appropriately applied in these circumstances, for example, Diagnostic Criteria for Psychiatric Disorders for Use with Adults with Learning Disabilities/Mental Retardation (DC-LD; Royal College of Psychiatrists, 2001) and Practice Guidelines for the Assessment and Diagnosis of Mental Health Problems in Adults with Intellectual Disability (Deb, Matthews, Holt, & Bouras, 2001); however, serious concerns about both the reliability and the validity of these approaches in diagnosing mental health disorders in persons with intellectual disabilities, with and without autism, remain.

Partly in response to these aforementioned challenges, the Diagnostic Assessment for the Severely Handicapped or DASH (which was later revised to become the DASH-II) was developed to explore issues of psychiatric and behavior disorders specifically among individuals with severe and profound intellectual disability (Matson, 1995; Matson, Gardner, Coe, & Sovner, 1991b). Items that appear in the rating scale were derived from DSM-III-R as well as from prior research on maladaptive behaviors in lower-functioning individuals. The instrument consists of 84 items that are grouped into 13 subscales. According to its developers, the first five subscales cover the "classic" forms of mental illness (i.e., anxiety, PDD/autism, mania, depression, and schizophrenia), and the eight remaining subscales cover a range of aberrant or maladaptive behaviors (i.e., stereotypies/tics, self-injury, eating disorders, sleep disorders, sexual disorders, organic syndromes, elimination disorders, and impulse control

problems and other miscellaneous behaviors). A third-party informant uses a 3-point scale to rate each item on the DASH-II on the dimensions of frequency, severity, and duration. Scores range from 0 to 2 on frequency (whether the behavior has occurred between 0 to more than 10 times in the last 2 weeks), duration (whether the behavior has occurred anywhere from less than 1 month to up to more than 1 year), and severity (the extent of the damage or disruption caused by the behavior, ranging from no disruptions or damages, to caused injury or property damage at least once). The DASH-II has been shown to be a reliable instrument (Sevin, Matson, Williams, & Kirkpatrick-Sanchez, 1995), and several subscales have been validated by its primary author as screening tools for specific disorders (Matson *et al.,* 1999; Matson & Smiroldo, 1997; Matson, Smiroldo, & Hastings, 1998). This instrument thus offers a systematic approach to documenting behaviors that are likely to be associated with psychiatric and behavior disorders in persons with severe intellectual disability, and it provides the opportunity to compare groups of individuals to determine whether such disorders are different between the groups. Although it may appear that the different subscales described in this instrument (such as "anxiety," "mania," "schizophrenia," and "sleep disorder") infer psychiatric etiological diagnoses, it should be noted that these subscale categories are not synonymous with DSM or ICD clinical psychiatric diagnoses. The validity of many or most of these subscales in correctly diagnosing such underlying psychiatric conditions in low-functioning, nonverbal individuals remains to be determined (as it does for any other diagnostic approach currently available), and this should be facilitated in the future by the identification of objective biomedical markers for these conditions.

Studies using the DASH have provided some information on the rates and pattern of psychiatric and behavior disorder among selected populations of individuals with severe and profound intellectual disability, with and without an additional diagnosis of PDD/autism. They offer evidence of higher rates of such disorder among adults with autism or autistic-like behavior. In two studies involving large groups of adults living in institutions, DASH frequency-subscale scores were highest for elimination disorders, PDD/autism, mania, and stereotypies/tics (Cherry, Matson, & Paclawskyj, 1997; Matson *et al.,* 1991b). In terms of "clinical significance" (as determined by the scoring criteria for the instrument), PDD/autism, mania, impulse control disorders, organic syndromes, and stereotypies/tics were among the most commonly occurring psychiatric and aberrant behavior disorders. In a more narrowly focused study, Matson, Baglio, Smiroldo, Hamilton, and Paclawskyj (1996a) found that rates of stereotypies/tics, mania, impulse-control disorders, and organic disorders were at least 25% higher among adults who met the DASH-II scoring criteria for PDD/autism versus those who did not. In addition, Matson *et al.* (1999), using the DASH-II, found that stereotypies/tics and impulse-control disorders were the two most common comorbid disorders occurring in a group of institutionalized adults who had previously received a DSM-IV diagnosis of autism.

This study, focusing on lower-functioning individuals, was designed to rigorously test the hypothesis that rates of psychiatric and behavior disorders are higher among individuals with autism and severe intellectual disability compared with individuals who do not have the additional diagnosis of autism. Participants were grouped according to the presence or absence of autism; the etiology of the autism or intellectual disability, where known, was not a defining group characteristic. The participants were drawn from a larger epidemiological study on the prevalence of mental health disorders among adolescents and young adults with intellectual disability, and as such represented the total population in a defined geographic area rather than an institutionalized or clinical sample. We used a mental health screening tool (the DASH-II) that has gained acceptance in clinical and research studies (and that, to our knowledge, is the only instrument in existence at the time of the study that was based on DSM nosology and had established psychometric properties) to study differences between the groups.

## METHOD

### Recruitment of Participants

The participants for this study were drawn from the population of adolescents and young adults with intellectual disability living in the Niagara Region of Southern Ontario, Canada (Bradley, Thompson, & Bryson, 2002). At the time of the investigation, the Niagara region had a population of around 400,000 people, with a mix of rural and urban lifestyles and socioeconomic circumstances reflecting the diversity found in the other parts of the province (Statistics Canada, 1996). To be eligible for inclusion in the larger study of mental health disorders, participants had to be between the ages of 14 and 20 years as of June 1, 1994, and to have a confirmed diagnosis of intellectual disability. Potential participants were recruited

primarily through approaching public and separate school boards, various parent groups, and agencies serving persons with intellectual disability.

Psychometric testing of all potential participants identified 171 individuals ("participants") as having intellectual disability (full scale IQ $\leq$ 75). These participants underwent an assessment to determine whether they met diagnostic criteria for autism. In addition to completing the DASH-II, caregivers took part in an evaluation of the participant's adaptive functioning and provided some background medical and demographic information. The subset of individuals with severe and profound intellectual disability was identified subsequently.

### Assessment of Cognitive and Adaptive Functioning

Because of the age range and functioning levels of the participants, a variety of tests was used to assess their cognitive functioning. Nonverbal IQ was obtained from either the performance scale of the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981) for participants who were 17 years of age and older or the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1974) for participants up to the age of 16 years 11 months; less capable individuals were administered the Merrill-Palmer Scale of Mental Tests (Stutsman, 1948), excluding verbal items. Language ability (specifically, single-word receptive vocabulary) was measured using the Peabody Picture Vocabulary Test-Revised, Form L (Dunn & Dunn, 1981). The Vineland Adaptive Behavior Scales-Survey Edition (VABS; Sparrow, Balla, & Cicchetti, 1984) was used to assess the participants' functioning in the areas of communication (expressive, receptive, and written), socialization (interpersonal relations, play and leisure, and coping skills), and daily living skills (personal, domestic, and community). The maladaptive behavior domain (Parts 1 and 2) from the VABS was also administered. Part 1 of the domain considers minor behavioral issues, whereas part 2 describes more serious behavioral concerns.

### Autism Diagnostic Interview-Revised

The ADI-R (Lord *et al.,* 1994) was used to assess the presence of autism. The ADI-R is a semistructured interview that is linked to ICD-10 and DSM-IV criteria for autism. It yields separate scores in three domains—communication, social interaction, and restricted, repetitive, and stereotyped behaviors. Because many of the participants were functioning at a very low level (mental age of less than 1–2 years), a modified ADI (Bryson & Bradley, 2004) was developed that was appropriate for these lower-functioning individuals. The ADI-R cut-off scores were not changed in the modified version.

### Assessment of Psychopathology and Maladaptive Behavior

The DASH-II (Matson, 1995; Matson *et al.,* 1991b) was used to screen for behavioral and psychiatric disorder. The DASH-II was administered as per the protocol outlined in the manual. The interviewer read each item aloud to the informant, providing explanations as needed. The informant then recorded his or her response for each item, consisting of a separate rating score on the dimensions of frequency, duration, and severity. Frequency scores were tallied for the anxiety, depression, mania, PDD/autism, schizophrenia, stereotypies/tics, organic syndromes, and impulse-control disorders subscales, and the resultant scores were compared to the established cutoffs for clinical significance (Matson, 1995). Clinical significance was considered to have been met when a participant's score reached or surpassed the cutoff score. For the remaining subscales (self-injury, elimination, eating, sleep, and sexual disorders), clinical significance was based on at least one subscale item receiving a severity score of 1 or 2. DASH-II factor scores were computed using the factor structure and scoring criteria that were outlined by Matson, Coe, Gardner and Sovner (1991a).

### Procedure

The interviews and assessments took place in a location that was convenient for the participants and their caregivers; most often this was their own homes. Research staff were trained by an experienced psychologist in the administration and scoring of the cognitive and adaptive assessments. Training in the administration of the ADI-R interviews was provided by observing and scoring teaching tapes with supervision from persons trained in its use. All ADI-R interviews were conducted by one of two research staff, both of whom met the recommended criterion of greater than 85% interrater reliability, as per the criteria outlined by Lord, Rutter, and Le Couteur (1994) regarding the use of the ADI-R for research purposes. Two additional steps were taken to ensure agreement regarding the identification of autism in these lower-functioning individuals: first, all interviews were audiotaped, and interrater

agreement between the two interviewers was checked at regular intervals throughout the study. In addition, the audiotapes were independently reviewed by two of the authors (E. Bradley and S. Bryson). Difficulties in scoring individual items occasionally arose in association with very low levels of functioning or where there were additional sensory or motor impairments. These difficulties were resolved by considering observations made by research staff at the time of psychological assessment, and through consensus. Research staff were also trained on the administration and scoring of the DASH-II according to the instructions provided in the manual (Matson, 1995).

The ADI-R, VABS, and DASH-II were completed during a face-to-face interview with an informant who had interacted with the participant on a daily basis over at least the last 5 years. Almost all of the informants were parents.

Fifty-seven participants achieved either a nonverbal IQ < 40 or were untestable because of lack of ability on the particular measure of nonverbal performance. Of these 57 participants, 20 (35%) met the criteria for a diagnosis of autism on the ADI-R. It was possible to individually match 12 of these individuals with autism to one of the remaining 37 participants on the basis of gender, chronological age, and where available, performance IQ. Other factors were also taken into consideration during the matching process, such as the presence of a major medical problem, motor impairment, or Down syndrome.

The groups were each composed of eight males and four females. The mean age of the participants was 16.33 years (SD = 2.2 years) for those with autism and 16.08 years (SD = 2.8 years) for those without autism. To overcome the problem of participants who were untestable on the nonverbal measures or who were tested with different instruments, standard scores from the VABS are used (see Fombonne, 1992). These data consist of the adaptive behavior composite (T) and scores in the domains of communication (C), socialization (S), and daily living skills (DLS). For the group with autism, the mean standard scores are as follows: T = 20.33, C = 19.83, S = 20.17, and DLS = 22.42. The median standard score for each of the domains and the total composite was less than 20 (see Fombonne, 1992). For the nonautistic group, the mean standard scores are as follows: T = 24.75, C = 22.75, S = 30.08, and DLS = 24.92. As for the group with autism, the median standard score for each of the domains and the total was less than 20. Comparability of the groups was assessed using a series of independent-samples *t*-tests for each of the measures. The only test to reach significance was for the socialization standard scores [$t(22) = -2.348$, $p < .05$]. See Table I for additional information regarding the characteristics of the participants.

**Table I.** Additional Characteristics of Participants

| | Participants with autism | | Participants without autism | |
|---|---|---|---|---|
| Variable | No. | % | No. | % |
| Comorbid disability | | | | |
| Visual impairment | 2/12 | 17 | 1/12 | 8 |
| Hearing impairment | 2/12 | 17 | 0/12 | 0 |
| Motor problems[a] | 3/12 | 25 | 6/12 | 50 |
| Seizure disorder | 3/12 | 25 | 7/12 | 58 |
| Medication | | | | |
| Yes | 8/12 | 66 | 9/12 | 75 |
| No | 4/12 | 34 | 3/12 | 25 |
| Participants taking medication[b] | | | | |
| Anticonvulsant | 3/8 | 38 | 7/9 | 78 |
| Psychotropic[c] | 5/8 | 63 | 1/9 | 11 |
| Medical problem | 0/8 | 0 | 2/9 | 22 |
| Previous diagnosis of autism/PDD or reference to autistic-like traits | 7/12 | 58 | 0/12 | 0 |

[a] Classification of gross motor function from Palisano *et al.* (1997).
[b] Categories are not mutually exclusive.
[c] Psychotropic drug classes and specific medications consisted of antidepressants (paxil, prozac), mood stabilizers (tegretol), neuroleptics (risperidol, neuleptil), and anxiolytics (buspar).

### Data Analysis

Data were analyzed using SPSS Version 9.0 for Windows. Because of the finding that 42% of the participants with autism were taking psychotropic medication, versus only 8% of the participants without autism, a multivariate analysis of covariance (MANCOVA) procedure with psychotropic medication as the covariate was used to rule out a potential confound. Because the multivariate *F* values were significant for group but not medication for both the DASH-II frequency and factor scores, the covariate was dropped from subsequent analyses. Independent-samples *t*-tests were used post hoc to investigate between-group differences on the DASH-II frequency and factor scores as well as the raw scores from the VABS maladaptive behavior scale. Levene's test for homogeneity of variance (Miller, 1996) was performed on the data. In the event that this test was significant, equal variances were not assumed, and the *t*-value based on separate variances was reported. Throughout the analyses, one-tailed tests of significance were used in light of predictions that the group with autism would receive higher scores on measures of psychiatric and behavior disorders. Second, the proportion of participants in both groups who reached clinical significance for each disorder on the DASH-II was compared using a nonparametric test ($\chi^2$). Third, a Pearson correlation coefficient was calculated between the total frequency scores on the DASH-II and the total raw scores from the VABS maladaptive behavior scale.

## RESULTS

Table II shows the mean total frequency score on the DASH-II along with the mean frequency scores for each of the subscales, by group. Participants with autism showed significantly higher scores (indicative of greater disturbance) than participants without autism for the total score and for seven of the 13 subscales. Specifically, participants with autism received significantly higher scores on four of the five subscales that make up the group of psychiatric disorders and three of the eight subscales that make up the group of aberrant behavior disorders.

Rates for disorders that reached clinical significance (as defined by the DASH-II scoring criteria) were examined next. Fifty percent or greater of the participants with autism reached clinical significance for seven disorders compared with one disorder meeting DASH-II clinical criteria for the participants without autism (see Table III). The number of participants

**Table II.** Mean Frequency Scores on the DASH-II Subscales

| | Participants with autism | | Participants without autism | | |
|---|---|---|---|---|---|
| DASH-II Subscale | Mean | SD | Mean | SD | *t* value and *p* level[a] |
| Anxiety[b] | 2.00 | 2.41 | .17 | .39 | 2.599, $p < .01$ |
| PDD/autism[c] | 6.50 | 2.68 | 1.92 | 1.51 | 5.166, $p < .001$ |
| Mania[c] | 4.58 | 2.87 | 1.92 | 1.98 | 2.648, $p < .01$ |
| Depression[d] | 7.25 | 5.34 | 2.08 | 1.98 | 3.141, $p < .01$ |
| Schizophrenia[e] | 1.17 | 1.03 | .67 | .98 | 1.216, $p > .05$ |
| Stereotypies/tics[c] | 6.08 | 2.87 | 2.08 | 1.88 | 4.033, $p < .001$ |
| Self-injury[f] | 1.58 | 1.68 | 1.17 | 1.34 | .673, $p > .05$ |
| Eating disorders[f] | 2.00 | 1.21 | 1.00 | 1.76 | 1.625, $p > .05$ |
| Sleep disorders[f] | 1.67 | 2.06 | .25 | .62 | 2.281, $p < .05$ |
| Sexual disorders[f] | .75 | 1.71 | .083 | .29 | 1.330, $p > .05$ |
| Impulse control[g] | 6.25 | 6.47 | 3.25 | 1.86 | 1.544, $p > .05$ |
| Organic syndromes[c] | 4.25 | 2.80 | 1.42 | 1.51 | 3.087, $p < .01$ |
| Elimination disorders[f] | .67 | 1.07 | .17 | .58 | 1.421, $p > .05$ |
| Total score | 44.75 | 26.84 | 16.17 | 9.28 | 3.486, $p < .001$ |

[a] One-tailed test.
[b] Frequency cutoff score $\geq 2$.
[c] Frequency cutoff score $> 4$.
[d] Frequency cutoff score $\geq 6$.
[e] Frequency cutoff score $> 2$.
[f] Severity cutoff score $\geq 1$.
[g] Frequency cutoff score $\geq 8$.

**Table III.** Percentage of Participants Reaching Clinical Significance on the DASH-II Subscales[a]

| DASH-II Subscale | Percentage of participants with autism | Percentage of participants without autism | $\chi^2$ and $p$ level[b] |
|---|---|---|---|
| Anxiety | 42 | 0 | 6.316, $p < .05$ |
| PDD/autism | 83 | 0 | 17.143, $p < .001$ |
| Mania | 67 | 8 | 8.711, $p < .01$ |
| Depression | 50 | 8 | 5.042, $p < .05$ |
| Schizophrenia | 8 | 8 | .000, $p > .05$ |
| Stereotypies/tics | 67 | 0 | 12.000, $p = .001$ |
| Self-injury | 58 | 50 | .168, $p > .05$ |
| Eating disorders | 58 | 25 | 2.743, $p > .05$ |
| Sleep disorders | 50 | 8 | 5.042, $p < .05$ |
| Sexual disorders | 33 | 8 | 2.274, $p > .05$ |
| Impulse control | 25 | 0 | 3.429, $p > .05$ |
| Organic syndromes | 42 | 0 | 6.316, $p < .05$ |
| Elimination disorders | 25 | 8 | 1.200, $p > .05$ |

[a] Using criteria from Matson (1995).
[b] df = 1; one-tailed test.

in each group who scored at or above the clinical cutoff for each of the 13 subscales was compared using a $\chi^2$ statistic. Significant differences were found on seven of 13 subscales, with each time a greater proportion of participants with autism reaching clinical significance than participants without autism. The PDD/autism subscale correctly classified 83% of the individuals with autism and 100% of individuals without autism using the ADI-R diagnosis as the criterion for assignment into different groups ($\chi^2 = 17.143$, df = 1, $p < .001$). Participants with autism had on average 5.25 clinically significant disorders (excluding the diagnosis of PDD/autism) versus an average of 1.25 disorders in participants without autism. On closer inspection, 50% of the participants with autism had more than five clinically significant disorders, whereas the opposite trend prevailed for the participants without autism, with 75% of this group having one or no comorbid disorders.

The factor scores by group are presented in Table IV. Mean factor scores were significantly higher for participants with autism for social withdrawal, emotional lability, and sleep disorders.

The group means for the VABS maladaptive behavior domain were compared using an independent-samples $t$-test. The finding of greater behavioral disturbance in the group of participants with autism was borne out for the total raw score [$\overline{X} = 18.08$, SD = 10.87 for the participants with autism, and $\overline{X} = 7.25$, SD = 5.15 for the participants without autism, $t(22) = 3.118$, $p < .01$]. The total frequency scores on the DASH-II were correlated with the VABS maladaptive domain raw scores, yielding a strong positive correlation ($r = .868$, $p < .001$).

**Table IV.** Comparison of DASH-II Factor Scores

| | Participants with autism | | Participants without autism | | |
|---|---|---|---|---|---|
| Factor | Mean | SD | Mean | SD | $t$ value and $p$ level[a] |
| Emotional lability | 2.50 | 2.58 | 1.00 | 1.54 | 1.732, $p = .05$ |
| Aggression/conduct | 2.83 | 3.93 | 1.08 | 1.16 | 1.480, $p > .05$ |
| Language disorder | 2.25 | 3.05 | .75 | .97 | 1.625, $p > .05$ |
| Social withdrawal | 8.00 | 3.77 | 2.25 | 1.54 | 4.894, $p < .001$ |
| Eating disorders | 1.75 | 1.29 | 1.17 | 1.53 | 1.011, $p > .05$ |
| Sleep disorders | 1.50 | 1.88 | .42 | 1.00 | 1.762, $p < .05$ |

[a] One-tailed test.

## DISCUSSION

This study compared psychiatric and behavior disorders in two groups, one with a diagnosis of autism, the other without, of adolescents and young adults with severe intellectual disability who were drawn from the total population in this age range living in a defined geographic area. Our aim was to catalog a range of behaviors in the two groups and then to use a controlled comparative approach to establish which behaviors are more specifically related to autism versus intellectual disability in general. It was hypothesized that the participants with an independently confirmed diagnosis of autism would display higher rates of disorder relative to nonautistic controls who were individually matched for gender, chronological age, and performance IQ. Data were obtained using the DASH-II, an informant-based instrument previously developed to screen for psychiatric and behavior disorders in lower-functioning individuals. The hypothesis of greater disturbance among participants with autism was borne out in a straightforward manner in relation to the frequency scores on the DASH-II; the total frequency score was almost three times higher for the participants with autism compared to those without autism.

A similar pattern of results occurred when individual items were grouped together to yield subscale and factor scores, with higher scores reflecting significantly greater disturbance for the participants with autism on seven of 13 subscales and three of six factors. Looking first at the subscale scores, the significant findings were divided almost evenly between the group of "psychiatric disorders" (i.e., anxiety, PDD/autism, mania and depression, as defined in the DASH-II) and the group of "aberrant behavior disorders" (i.e., stereotypies/tics, sleep disorders, and organic syndromes, again as defined in the DASH-II). The higher scores for the PDD/autism subscale are to be expected because all participants in the autism group were selected because they met ADI-R criteria for autism. Turning next to the factor scores, the largest significant difference was found for the social withdrawal factor. This finding can be explained in relation to the items that load on this factor (four of eight items come from the autism/PDD subscale) and the fact that seven of eight items met the Matson *et al.* (1996a) criterion for a critical (i.e., $\geq$30%) between-group difference, whereas the eighth item approached significance (25% difference). The other two factor scores to reach significance were emotional lability and sleep disorders. Both of these factors contained one critical item as opposed to numerous critical items for the social withdrawal factor.

The PDD/autism subscale scores showed good discriminant validity when evaluated against the ADI-R—considered to be the gold standard for assessing autism. Only two participants with an ADI-R diagnosis of autism were misclassified, as their scores did not exceed the clinical cutoff for the autism/PDD scale, whereas all 12 participants without autism were correctly classified. In contrast Matson, Smiroldo, and Hastings (1998) reported that the DASH-II correctly classified 100% of institutionalized adults who met DSM-IV diagnostic criteria for autism and 89% of controls who had not received a clinical diagnosis. One of the participants with autism in this study who was incorrectly classified received a frequency score of four on the PDD/autism subscale, which is just below the clinical cutoff. The other participant received a frequency score of one on the PDD/autism subscale; moreover, this individual also had the lowest total (i.e., including all subscales) frequency score among all the participants with autism.

Group differences emerged in the rate and pattern of comorbid psychiatric and behavior disorders. On average, the rate of comorbidity was four times higher in the group with autism than in the nonautism group, again confirming our hypothesis that in the larger group of persons with intellectual disability, those with co-existing autism contribute disproportionately to the overall prevalence rate of psychiatric and behavior disorders. The process of diagnosing mental health disorders in individuals with severe intellectual disability is complex and challenging, in part because of differing views regarding the definition of such disorders; that is, whether to take a categorical approach (e.g., using DSM-IV diagnostic criteria) versus a more dimensional approach (e.g., using scores on a continuous rating scale that provide a quantitative measure of disturbance; see Brereton & Tonge, 2001, for further discussion of these concepts). These conceptual issues take on greater prominence in the case of individuals with autism and severe intellectual disability, as evidenced by ongoing debate regarding whether additional disturbance is really a manifestation of the underlying autistic disorder (American Academy of Child and Adolescent Psychiatry, 1999; Tsai, 1996).

Current clinical practice in diagnosing mental health disorders in persons with severe intellectual disability is heavily dependent on obtaining as much clinical data as possible from a variety of key informants to develop a longitudinal picture of behavior, an understanding of current symptomatology and behavior in relation to baseline or typical patterns of behavior, and an appreciation of the biopsychosocial circumstances of the individual and any changes in these. Establishing

what is "normal" for a given individual is often difficult in light of competing behavioral concerns that can cloud the picture and the need to obtain input from knowledgeable informants who may hold different subjective views. The DASH-II, with its operational definitions of behavior and the scoring dimensions of frequency, severity, and duration, helps to overcome some of these difficulties. However, it provides at best a "snapshot" of current behavior versus data regarding the onset, duration, pattern, and magnitude of behavior changes, all of which, in addition to any changes in the biopsychosocial circumstances of the individual, are taken into consideration in clinical (e.g., according to DSM criteria) diagnostic formulations. Thus, statements regarding the rates of clinical "disorders" based solely on data from the DASH-II must be interpreted with caution. Nonetheless, the instrument does seem to be a useful screening tool for detecting potential mental health disorders, and as such, can help to identify those individuals who require a more thorough and intensive clinical evaluation, particularly those who score above the clinical cutoff for PDD/autism.

Additional support in this study for the hypothesis of greater disturbance among individuals with severe intellectual disability and autism versus those without an additional diagnosis of autism was provided by two sources: the higher scores by the former group on the maladaptive behavior scale from the Vineland, and data regarding the prevalence of psychotropic medication use among the participants in the study. Approximately two-thirds of the participants with autism who were receiving medication were taking psychotropic drugs, whereas only one of the participants without autism was taking such medication. In the latter group, anticonvulsant medication use was twice as high proportionately, a finding that was roughly in keeping with the number of participants with active seizure disorders.

Follow-up studies of children with autism have shown that aggravation of symptoms or deterioration in behavior may occur in a half to a third of children around the time of puberty and early adolescence (Gillberg & Schaumann, 1981; Gillberg & Steffenburg, 1987; Kobayashi, Murata, & Yashinaga, 1992; Rutter, Greenfield, & Lockyer, 1967). Although the cause of this deterioration is poorly understood, researchers have documented a peak onset of seizures during these adolescent years (with up to one-third having developed seizures by late adolescence), although not all children who showed deterioration developed seizures. In our study, one-quarter of those with autism had seizures or a history of seizures compared with one-half of those without autism. The high rate of seizures in the group without autism is not unexpected given the reported increasing prevalence of seizures with increasing intellectual impairment (see Sillanpaa, 1999, for a review of this issue). However, our finding of a three- to fourfold increase in psychiatric and behavior disorders (as measured by the DASH-II) in the autism group compared with the group without autism, in the absence of a parallel difference in seizure rate, indicates that this greater rate of disorders in the autism group is not primarily seizure related.

Our study has a number of strengths and unique features. These include its rigorous ascertainment methods and the fact that the study population was drawn from the total group of adolescents and young adults in a specific geographic area that had a mix of services and supports for persons with intellectual disability, rather than being restricted to a clinical or institutional sample. Some cautions are in order as well. Although the sample size was relatively small ($n = 24$), and replication with larger numbers is desirable, it is important to bear in mind that this sample was drawn from a much larger population base of around 400,000 people. Given the exploratory nature of the study, several statistical analyses were conducted that may increase the probability of type I errors. Future studies should take a more conservative approach and use procedures to guard against this possibility.

One of the most intriguing of the questions that arise from the findings is why autism is associated with higher rates of mental health disorders in lower-functioning individuals. The answer to this question likely reflects a complex interaction among neurophysiological, biochemical, genetic, and psychosocial factors and requires a more comprehensive evaluation using different diagnostic approaches. The current findings, using a screening instrument, point to specific vulnerability in persons with autism in areas of mood, anxiety, sleep, organic syndromes, and stereotypies/tics, and as such may provide a starting point for more focused research inquiry. In the meantime, decisions about pharmacological treatment for these conditions must continue to be based on an individualized clinical approach.

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## REFERENCES

American Academy of Child and Adolescent Psychiatry (1999). Practice parameters for the assessment and treatment of children, adolescents, and adults with autism and other pervasive developmental disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 38,* 32S–54S.

American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders.* (4th ed.). Washington, DC: Author.

Borthwick-Duffy, S. A. (1994). Epidemiology and prevalence of psychopathology in people with mental retardation. *Journal of Consulting and Clinical Psychology, 62,* 17–27.

Bradley, E. A., Thompson, A., & Bryson, S. E. (2002). Mental retardation in teenagers: Prevalence data from the Niagara Region, Ontario, Canada. *Canadian Journal of Psychiatry, 47,* 427–434.

Bregman, J. D. (1991). Current developments in the understanding of mental retardation. Part II: Psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 30,* 861–872.

Brereton, A. V., & Tonge, B. J. (2001, September). *Psychopathology in children and adolescents with autism compared to an epidaemiological sample of young people with intellectual disability and syndrome groups.* Paper presented at the Australian National Autism Conference, Adelaide, Australia.

Bryson, S. E. (1996). Brief report: Epidemiology of autism. *Journal of Autism and Developmental Disorders, 26,* 165–167.

Bryson, S. E., & Bradley, E. A. (2004). *Prevalence of autism among adolescents with intellectual disability.* Manuscript in preparation.

Cherry, K. E., Matson, J. L., & Paclawskyj, T. R. (1997). Psychopathology in older adults with severe and profound mental retardation. *American Journal on Mental Retardation, 101,* 445–458.

Deb, S., Matthews, T., Holt, G., & Bouras, N. (Eds.) (2001). Practice guidelines for the assessment and diagnosis of mental health problems in adults with intellectual disability. The European Association for Mental Health in Mental Retardation. Brighton: Pavilion Press.

Dunn, L. M., & Dunn, L. M. (1981). *Manual for the Peabody Picture Vocabulary Test-Revised, Forms L and M.* Circle Pines, MN: American Guidance Service.

Dykens, E. M., Hodapp, R. M., & Finucane, B. M. (2000). *Genetics and Mental Retardation Syndromes.* Baltimore, MD: Paul Brookes Publishing.

Fombonne, E. (1992). Diagnostic assessment in a sample of autistic and developmentally impaired adolescents. *Journal of Autism and Developmental Disorders, 22,* 563–581.

Ghaziuddin, M., Alessi, N., & Greden, J. F. (1995). Life events and depression in children with autism and pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 25,* 495–502.

Gillberg, C., & Schaumann, H. (1981). Infantile autism and puberty. *Journal of Autism and Developmental Disorders, 11,* 365–371.

Gillberg, C., & Steffenburg, S. (1987). Outcome and prognostic factors in infantile autism and similar conditions: A population-based study of 46 cases followed through puberty. *Journal of Autism and Developmental Disorders, 17,* 273–287.

Kim, J. A., Szatmari, P., Bryson, S. E., Streiner, D. L., & Wilson, F. J. (2000). The prevalence of mood problems among children with autism and Asperger syndrome. *Autism, 4,* 117–132.

King, B. H., DeAntonio, C., McCracken, J. T., Forness, S. R., & Ackerland, V. (1994). Psychiatric consultation in severe and profound mental retardation. *American Journal of Psychiatry, 151,* 1802–1808.

Kobayashi, R., Murata, T., & Yashinaga, K. (1992). A follow-up study of 201 children with autism in Kyushu and Yamaguchi Areas, Japan. *Journal of Autism and Developmental Disorders, 22,* 395–411.

Lainhart, J. E., & Folstein, S. E. (1994). Affective disorders in people with autism: A review of published cases. *Journal of Autism and Developmental Disorders, 24,* 587–601.

Lord, C., Riei, S., Lambrecht, L., Cook, E. H., Leventhal, B. L., DiLavore, P. C., Pickles, A., & Rutter, M. (2000). The Autism Diagnostic Observation Schedule-Generic: A standard measure of social and communication deficits associated with the spectrum of autism. *Journal of Autism and Developmental Disorders, 30,* 205–223.

Lord, C., Rutter, M., & Le Couteur, A. (1994). Autism Diagnostic Interview-Revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 24,* 659–685.

Matson, J. L. (1995). *The Diagnostic Assessment for the Severely Handicapped-Revised (DASH-II).* Baton Rouge, LA: Scientific Publishers.

Matson, J. L., Baglio, C. S., Smiroldo, B. B., Hamilton, M., & Paclawskyj, T. (1996a). Characteristics of autism as assessed by the Diagnostic Assessment for the Severely Handicapped-II (DASH-II). *Research in Developmental Disabilities, 17,* 135–143.

Matson, J. L., Benavidez, D. A., Compton, L. S., Paclawskyj, T., & Baglio, C. (1996b). Behavioral treatment of autistic persons: A review of research from 1980 to the present. *Research in Developmental Disabilities, 17,* 433–465.

Matson, J. L., Coe, D. A., Gardner, W. I., & Sovner, R. (1991a). A factor analytic study of the Diagnostic Assessment for the Severely Handicapped. *Journal of Nervous and Mental Disease, 179,* 553–557.

Matson, J. L., Gardner, W. I., Coe, D. A., & Sovner, R. (1991b). A scale for evaluating emotional disorders in severely and profoundly mentally retarded persons. *British Journal of Psychiatry, 159,* 404–409.

Matson, J. L., Rush, K. S., Hamilton, M., Anderson, S. J., Bamburg, J. W., Baglio, C. S., Williams, D., & Kirkpatrick-Sanchez, S. (1999). Characteristics of depression as assessed by the Diagnostic Assessment for the Severely Handicapped-II (DASH-II). *Research in Developmental Disabilities, 20,* 305–313.

Matson, J. L., & Smiroldo, B. B. (1997). Validity of the mania subscale of the Diagnostic Assessment for the Severely Handicapped-II (DASH-II). *Research in Developmental Disabilities, 18,* 221–225.

Matson, J. L., Smiroldo, B. B., & Hastings, T. L. (1998). Validity of the autism/pervasive developmental disorders subscale of the Diagnostic Assessment for the Severely Handicapped-II. *Journal of Autism and Developmental Disorders, 28,* 77–81.

Miller, R. G. (1996). *Beyond ANOVA: Basics of applied statistics* (2nd ed.). London: Chapman and Hall.

Nordin, V., & Gillberg, C. (1996). Autism spectrum disorders in children with physical or mental disability or both. II Screening aspects. *Developmental Medicine and Child Neurology, 38*, 314–324.

Palisano, R., Rosenbaum, P., Walter, S., Russell, D., Wood, E., & Galuppi, B. (1997). Gross motor function classification system for cerebral palsy. *Developmental Medicine and Child Neurology, 39,* 214–223.

Reid, A. H. (1980). Diagnosis of psychiatric disorder in the severely and profoundly mentally retarded. *Journal of the Royal Society of Medicine, 73,* 607–609.

Royal College of Psychiatrists (2001). *Diagnostic Criteria for Psychiatric Disorders for Use with Adults with Learning Disabilities/ Mental Retardation (DC-LD).* London: Gaskell Press.

Rutter, M., Greenfield, D., & Lockyer, L. (1967). A five-to-fifteen year follow up study of infantile psychosis: II. Social and behavioural outcomes. *British Journal of Psychiatry, 113,* 1183–1189.

Sevin, J. A., Matson, J. L., Williams, D., & Kirkpatrick-Sanchez, S. (1995). Reliability of emotional problems with the Diagnostic Assessment for the Severely Handicapped (DASH). *British Journal of Clinical Psychology, 34,* 93–94.

Sillanpaa, M. (1999). Definitions and epidemiology. In M. Sillanpaa, L. Gram, S. I. Johannessnen, & T. Tomson (Eds.), *Epilepsy and mental retardation* (pp. 1–5). Petersfield, Hampshire: Wrightson Biomedical.

Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984). *Vineland Adaptive Behavior Scales: Survey Form Manual.* Circle Pines, MN: American Guidance Service.

Statistics Canada, CANSIM (1996). *Population by age group.* Ottawa: Author.

Stromme, P., & Diseth, T. H. (2000). Prevalence of psychiatric diagnoses in children with mental retardation: Data from a population-based study. *Developmental Medicine and Child Neurology, 42,* 266–270.

Stutsman, R. (1948). *Guide for administering the Merrill-Palmer Scale of Mental Tests.* New York: Harcourt, Brace, & World.

Tsai, L. Y. (1996). Brief report: Cormorbid psychiatric disorders of autistic disorder. *Journal of Autism and Developmental Disorders, 26,* 159–163.

Wechsler, D. (1974). *Wechsler Intelligence Scale for Children-Revised.* San Antonio, TX: Psychological Corporation.

Wechsler, D. (1981). *Wechsler Adult Intelligence Scale-Revised.* San Antonio, TX: Psychological Corporation.

World Health Organization (1992). *The ICD-10 Classification of Mental and Behavioural Disorders—Clinical Descriptions and Diagnostic Guidelines.* Geneva: Author.