Assessing ADHD Behavior-Related Family Stressors with the DBSI:

A Replication and Extension

Steven K. Reader[1], Lindsay E. McAlister[1,] and James H. Johnson[1]

[1]Department of Clinical & Health Psychology, University of Florida, Gainesville, FL

Please address correspondence to: Steven K. Reader, Ph.D., Department of Clinical & Health Psychology, University of Florida, P.O. Box 100165, Gainesville, FL 32610-0165. Phone: (352) 273-5124; Fax: (352) 273-6156; E-mail: stevread@phhp.ufl.edu

The work reported in the attached paper entitled Assessing ADHD Behavior-Related Family Stressors with the DBSI: A Replication and Extension has not been and is not intended to be published anywhere except in the Journal of Clinical Psychology in Medical Settings.

Abstract

The Disruptive Behavior Stress Inventory (DBSI) was developed to provide information related to the occurrence and severity of specific stressors that result from having a child with ADHD. Data provided in the initial study by Johnson and Reader (2002) provided good preliminary support for the reliability of the DBSI, as well the ability of the scale scores to differentiate parents of children with ADHD from parents of children with no history of ADHD. The present study was an attempt to replicate major findings of the 2002 study using an additional larger sample and extend it by conducting item-level analyses to determine the degree to which individual DBSI items differentiate parents of children with and without ADHD. Results provided additional support for the reliability and validity of the DBSI by replicating major findings from the 2002 study and further suggesting that a large majority of the 40 items individually differentiate between parents of children with ADHD and parents of children with no history of ADHD.

KEY WORDS: ADHD, parent, family, stress, children

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent chronic health conditions affecting school-aged children, with a prevalence rate between 4-12% in pediatric primary care settings (American Academy of Pediatrics [AAP], 2000). Clinically, children with ADHD display developmentally inappropriate patterns of inattention and/or hyperactive/ impulsive behaviors that are displayed across situations and cause impairment in social, academic, and/or family functioning. As many as two-thirds of clinic-referred children with ADHD have comorbid disorders, with oppositional defiant disorder, conduct disorder, learning disabilities, anxiety disorders, and mood disorders being among the most common (American Academy of Child and Adolescent Psychiatry [AACAP], 2007). Considering their difficulties with inattention and hyperactive-impulsive behaviors, along with associated comorbid conditions, it is not surprising that children with ADHD often have lower adaptive functioning, poor peer relationships, higher risk for unintentional injury, and engage in many behaviors that result in significant stress for caregivers (Barkley, 1998).

ADHD, Family Stress, and Caregiver/Family Functioning

Relevant to the challenges to effective parenting posed by the behaviors of children with ADHD, researchers have begun to emphasize the importance of evaluating everyday parenting events as significant sources of stress for caregivers (Crnic & Acevedo, 1995; Webster-Stratton, 1990). Children with ADHD vary in the degree to which their behaviors are experienced as disruptive or place excessive stress or burden on caregivers. Stress experienced by primary caregivers of children with ADHD does not result solely from dealing with symptoms of inattention, impulsivity, and overactivity but also from the other demands placed on them as a result of child problem behaviors. For example, primary caregivers of children with ADHD must

often deal with repeated phone calls from teachers regarding their child's behavior or academic difficulties, try to "explain" their child's behavior to other parents, miss work to attend clinic appointments, or spend long hours in the evenings helping their child with homework. These represent only a few of the stressors that are commonly reported by primary caregivers of children with ADHD.

There is strong research support for the notion that the behavior of children with ADHD can result in increased family stress. A number of studies, mostly focusing on mothers and using the Parenting Stress Index (PSI; Abidin, 1995), seem to indicate that parents of children with ADHD report higher levels of stress compared to parents of children from normative samples (Mash & Johnston, 1983; Breen & Barkley, 1988; DuPaul, McGoey, Eckert, & VanBrakle, 2001; Byrne, DeWofe, & Bawden, 1998; Baker & McCal, 1995). Studies have also shown that caregivers of children with ADHD often exhibit higher levels of adjustment problems. Some research has suggested that caregivers of children with ADHD show higher levels of depressive symptoms, (Befera & Barkley, 1985; Brown & Pacini, 1989; Cunningham, Benness, & Siegel, 1988; Mash & Johnston, 1983) , have a lower sense of efficacy, (Mash & Johnson, 1983; Johnston, 1996) and lower levels of satisfaction in the parenting role (Mash & Johnston, 1983; Podolski & Nigg, 2001) compared to normative samples. Several studies have also found significant levels of marital discord and strained interpersonal relationships in families where a child has ADHD (Befera & Barkley, 1985; Brown & Pacini, 1989; Johnston, 1996). Indeed, existing evidence seems consistent with the notion that the negative behaviors of children with ADHD can elicit negative parenting behaviors (Mash & Johnston, 1990), which in turn can lead to further disruptive child behaviors and a coercive cycle (Barkley, 1998; Webster-Stratton, 1990). There appear to be additional implications beyond the individual impact of these negative

adjustment outcomes for primary caregivers. For example, research has shown that maternal depression is related to a lower likelihood that mothers will complete parent training programs for child non-compliance (Forehand, Furey, & McMahon, 1984). To the extent that behaviors exhibited by children with ADHD represent significant family stressors and that these stressors are associated with negative outcomes, it seems essential that the nature and extent of ADHD-related family stress be considered in the assessment and treatment of children and families dealing with this disorder.

Development of the Disruptive Behavior Stress Inventory (DBSI)

A recent review (Johnston & Mash, 2001) indicates that most studies investigating ADHD-related caregiver stress levels have used the PSI (Abidin, 1995). The PSI is a psychometrically-sound and widely-utilized measure that is useful in documenting difficult child behavior and stress-related outcomes in families of children with ADHD and other disorders. It is a parent-report measure which assesses characteristics of the child (e.g., hyperactive/inattentive behavior, mood, demandingness), characteristics of the parent (e.g., feelings of competency, role restriction, isolation, attachment to child), and situation/demographic life stress factors that can place a strain on the parent-child system. A potential drawback, however, is that several PSI subscales directly assess disruptive child behavior, and thus results in shared variance between measures of child disruptive behavior and parenting stress (Anastopoulos, Guevremont, Shelton, & DuPaul, 1992). Other scales in the parent domain are perhaps more reflective of stress-related outcomes than specific stressors.

In response to the need for a measure that provides information regarding the occurrence and impact of specific family-related stressors that result from having a child exhibiting disruptive behavior, the Disruptive Behavior Stress Inventory (DBSI) was developed by Johnson

and Reader in 2002. The DBSI consists of 40 items. The format of the scale asks the primary caregiver to respond to each item by circling *Yes* (scored as 1) or *No* (scored as 0) to indicate whether they have experienced a particular stressor within the past 6 months. If the caregiver reports experiencing a specific stressor, he/she is asked to rate the degree of stress associated with that stressor on a continuum: 0 (*not at all stressful*), 1 (*somewhat stressful*, 2 (*moderately stressful*, 3 (*very stressful*). If a stressor has not been experienced, no rating of event stressfulness is provided. When scored, the DBSI yields two stress indices: a Stress Experience score and a Stress Degree score. The Stress Experience score is obtained by summing the total number of stressors reported by the caregiver during the past 6 months. The Stress Degree score is obtained by summing the stressfulness ratings for each item experienced.

In their initial study, Johnson and Reader (2002) found evidence to support the internal consistency of both the Stress Experience and Stress Degree subscales, with Cronbach's coefficient alpha values above .90 for both subscales. The mean corrected item-total correlations for the Stress Experience (.48) and Stress Degree (.58) subscales were found to be adequate. Group comparisons revealed that primary caregivers of children with ADHD experienced a significantly higher number of stressors on the Stress Experience subscale and found them to display significantly higher stress scores on the Stress Degree subscale than caregivers of children with no history of ADHD . Further, effect sizes for both the Stress Experience and Stress Degree indices were found to be large. Group comparisons based on ADHD subtype revealed that caregivers of children with the Combined subtype of ADHD had significantly higher stress scores on both DBSI indices compared to caregivers of children with the Primarily Inattentive subtype of ADHD.

Current Study

The first purpose of the current study was to obtain additional data regarding the psychometric properties of the DBSI by attempting to replicate the findings of the 2002 study using a separate and larger sample. The second purpose was to conduct an item-level analysis of both DBSI indices to assess the ability of each item on the Stress Experience and Stress Degree subscales to differentiate between parents of children with and without ADHD. The above aims were designed to expand upon the initial Johnson and Reader (2002) study and further evaluate the adequacy of the DBSI as a measure of parental stressors occurring as a result of having a child with ADHD.

METHOD

Replication study

Participants

Two groups of primary caregivers completed the DBSI for the replication segment of this study: primary caregivers of children with a DSM-IV-based primary diagnosis of ADHD (ADHD group) and primary caregivers of children from the general community without a documented history of ADHD (comparison group). Primary caregivers in the ADHD group were recruited through the University of Florida ADHD Program and the Psychology Clinic at the University of Florida Health Science Center. The interdisciplinary ADHD program is staffed by a developmental pediatrician, nurse, child psychiatrist, child clinical/pediatric psychologist, pediatric neuropsychologist, and speech/language pathologist. Evaluations of children and families as part of this interdisciplinary ADHD program consisted of gathering information from multiple informants across various settings and included comprehensive clinical interviews with the family, behavioral observations of the child, administration of behavior checklists to assess

for ADHD symptoms and comorbid features, and for some children for whom it is deemed appropriate, comprehensive psychoeducational testing and/or speech and language assessment. To be eligible for the study, children of primary caregivers in the ADHD group had to have received a formal DSM-IV primary diagnosis of ADHD from a program developmental pediatrician, child psychiatrist, or psychologist. Primary caregivers in the comparison group were recruited through fliers posted in the community, advertisements in the university medical center newsletter, and through a university-affiliated developmental research school comprised of grades K-12, with the student population being representative of the state's socioeconomic and racial-ethnic composition.

The ADHD caregiver group consisted of 71 primary caregivers (68 female and 3 male), with a mean age of 37.37 years (*SD* = 10.09) and range between 24 and 71 years. Caucasians (70%) made up the majority of primary caregivers in the ADHD group, with African-American (23%) and Latino American (7%) caregivers also included in the sample. Measures were completed on 49 boys and 22 girls, made up of 63% Caucasians, 23% African-Americans, 7% Latino-Americans, and 7% of Mixed/Other race. The mean age of children in the ADHD group was 8.21 (*SD* = 2.53), with a range between 4 and15 years. Of these children, 49 were currently taking medication to treat ADHD symptoms. The comparison group was made up of 79 primary caregivers (68 females and 11 males), with a mean age of 37.37 years (*SD* = 6.91) and range between 25 and 51 years. Caucasians (73%) made up the majority of primary caregivers in this group, with African-American (18%), Latino American (5%), Asian American (1%), and Mixed/Other (1%) race primary caregivers also included in the sample (2% missing data). Measures were completed based upon 39 boys and 40 girls, made up of 68% Caucasians, 20% African-Americans, 5% Mixed/Other race, 4% Latino-Americans, and 1% Asian-Americans (2%

missing data). Mean age of children in this group was 8.19 (*SD* = 2.25), with a range of between 4-14 years. Demographic data are presented in Table 1.

Procedure

Primary caregivers indicating an interest in participating in the study were provided more detailed study information through a study investigator's explanation of the IRB-approved informed consent form. If they indicated a willingness to participate in the study after reading the informed consent form, they were asked to sign the informed consent form. Primary caregivers participating in this study were asked to complete the DBSI and a demographic form. In the ADHD group, if a primary caregiver had more than one child with ADHD meeting study eligibility requirements, they were asked to select one child on which to base their responses. Similarly, primary caregivers in the comparison group with more than one child meeting study requirements were asked to select only one child on whom to base their responses. For caregivers who could not conveniently complete measures during their clinic appointment or travel to the university for a separate visit, an option to complete the questionnaires via mail was provided. For caregivers choosing this option, a study investigator called them to provide detailed instructions on how to complete the questionnaires and answer any questions. Mail out materials contained a self-addressed stamped envelope so caregivers could return completed materials at no cost.

Extension study

Participants

Data for the extension segment of this study, which aimed to evaluate the ability of individual DBSI items to differentiate between parents of children with ADHD and parents of children without a history of ADHD, was derived from the combination of data collected from

participants in the replication segment of this study as well as from participants in the original 2002 study. Recruitment procedures for these participants have been outlined previously and therefore will not be repeated here. Demographic data related to mean caregiver age and ethnicity was not collected in the original 2002 study, so only demographic information for caregivers from the replication sample is available (described in the previous section). The total ADHD group consisted of 124 primary caregivers (113 female and 11 male). Measures were completed regarding 94 boys and 30 girls. The mean age of children in the ADHD group was 8.70 (*SD* = 2.66), with a range of 4-15 years. Of these children, 88 were taking medication to treat ADHD symptoms. The comparison group was made up of 118 primary caregivers (103 females and 15 males). Measures were completed based upon 60 boys and 58 girls. Mean age of children in this group was 8.17 (*SD* = 2.58), with a range of between 4-14 years. Demographic data are presented in Table 1.

RESULTS

Replication study

Reliability

Using data from completed measures, initial analyses evaluated the reliability of both the Stress Experience and Stress Degree scales. Reliability analyses were conducted on both the ADHD sample (to replicate the Johnson & Reader 2002 study findings) and the combined total sample (ADHD and comparison group). Corrected item-total correlations were obtained, to assess the degree of consistency between individual items and the total scale score when excluding that item's contribution to the total score. Corrected item-total correlations were calculated for all 40 items on both the Stress Experience and Stress Degree scales. For the ADHD sample, the mean corrected item-total correlation for the Stress Experience scale was .41

(range = .07 - .60), and for the Stress Degree scale it was .49 (range = .24 - .67). For the combined ADHD and comparison sample, the mean corrected item-total correlation for the Stress Experience scale was .54 (range = .31 - .67) and for the Stress Degree scale it was .58 (range = .35 - .71). Across both DBSI indices for both the ADHD and comparison groups, item 18 ("Disagreements with spouse about managing your child's behavior") consistently showed the lowest item-total correlations.

The internal consistency of both scales was analyzed, using Cronbach's coefficient alpha, to determine the degree to which the items measure the same construct. For the ADHD sample, Cronbach's coefficient alpha was found to be .90 (n = 69) for the Stress Experience scale and .93 (n = 68) for the Stress Degree scale. For the combined sample, Cronbach's coefficient alpha was found to be .95 (n = 148) for the Stress Experience scale and .96 (n = 146) for the Stress Degree scale.

Discriminant Validity: Preliminary Analyses

The discriminant validity of the Stress Experience and Stress Degree scales was assessed by comparing scores of primary caregivers of children with ADHD with scores provided by parents of children in the comparison group. It was hypothesized that both scale scores would be significantly higher for primary caregivers of children with ADHD, similar to findings from the Johnson and Reader (2002) study. There was no significant difference in terms of child age between the ADHD and comparison groups, t (148) = -0.55, p = ns. Due to the disproportionate number of boys (n = 49) to girls (n = 22) in the ADHD group compared to the comparison group (boys n = 39, girls n = 40), an F-test was conducted to examine potential significant differences in scale scores between boys and girls in each group. For the Stress Experience scale, there was a significant difference in scores between primary caregivers of boys (M = 21.98, SD = 7.51) and

girls with ADHD (M = 17.05, SD = 9.24), $F(1, 69) = 5.67$, $p < .05$. There was no significant difference in the mean Stress Experience scale scores between primary caregivers of boys (M = 7.90, SD = 5.96) and girls (M = 7.05, SD = 8.24) in the comparison group. For the Stress Degree scale, there were no significant differences in scores between caregivers of boys (M = 43.00, SD = 22.73) and girls with ADHD (M = 34.77, SD = 22.84). There was also no significant difference in the mean Stress Degree score between caregivers of boys (M = 11.74, SD = 12.09) and girls (M = 11.05, SD = 16.67) in the comparison group. Given the significant difference in mean Stress Experience scores across child gender in the ADHD group, further group comparisons involved analyses of covariance (ANCOVA) using child gender as a covariate. Given the small number of children diagnosed with the primarily hyperactive/impulsive (n = 1) and inattentive (n = 4) subtypes of ADHD, analyses based on ADHD subtype were not conducted.

Discriminant Validity:- Stress Experience Scale

The results of contrasts between the ADHD and comparison group are shown in Table 2. Using child gender as a covariate, an ANCOVA was used to evaluate whether scores on the Stress Experience scale differentiated between primary caregivers of children with ADHD and primary caregivers of children in the comparison group. The ANCOVA showed significant mean score differences between groups, F (1, 147) = 94.95, $p < .001$, with primary caregivers of children with ADHD indicating more stressors experienced (M = 20.45, SD = 8.34) than caregivers of children in the comparison group (M = 7.47, SD = 7.17). The Cohen's f value of .84 represented a large effect size (Cohen, 1988). Child gender was a significant covariate ($p < .05$), and explained approximately 3% of the variance in the Stress Experience index scores.

Discriminant Validity:- Stress Degree Scale

The results of contrasts between the ADHD and comparison group are shown in Table 2. Using child gender as a covariate once again, an ANCOVA found that mean scores on the Stress Degree scale significantly differentiated caregivers of children with ADHD from caregivers of children from the comparison group, F (1, 147) = 80.22, $p < .001$. Caregivers of children with ADHD showed higher mean Stress Degree scores (M = 40.45, SD = 22.92) compared to caregivers in the comparison group (M = 11.39, SD = 14.50). The Cohen's f value of .77 represented a large effect size (Cohen, 1988). Child gender was not a significant covariate (p = .22).

DBSI Scores and Medication Status

An F-test was also conducted to evaluate whether the Stress Experience scale mean scores differed between primary caregivers of children who were currently on some type of ADHD medication regimen and those who were not currently taking any ADHD medication. Analyses found a significant difference between groups, F (1, 68) = 5.36, $p < .05$, with caregivers of children currently taking ADHD medication endorsing having experienced a higher frequency of stressors (M = 21.92, SD = 8.02) than caregivers of children not taking ADHD medication (M = 17.00, SD = 8.46). The Cohen's f value of .28 represented a medium effect size (Cohen, 1988).

Stress Degree scores also differentiated between caregivers of children taking ADHD medication and caregivers of children not taking ADHD medication, F(1, 68) = 5.24, $p < .05$. Similar to results with the Stress Experience scale, caregivers of children taking ADHD medication reported significantly higher degrees of stress (M = 44.63, SD = 23.49) compared to caregivers of children not taking ADHD medication (M = 31.29, SD = 19.40). The effect size in terms of a Cohen's f value was .28, representing a medium effect size (Cohen, 1988).

Extension study

Item Analysis - Stress Experience Scale

Chi-square analyses using Yates' Continuity Correction (Yates, 1934) was used to analyze the ability of each item on the Stress Experience index to differentiate between the ADHD and comparison groups. The continuity correction was used because the observed cell counts in the 2 x 2 tables were less than 5 for some items. The expected cell count was not less than 5 for any of the 2 x 2 matrices generated by the 40 items on this index. Given the number of analyses required to individually evaluate each of the 40 items on the DBSI, the Bonferroni correction was used to control error rates, with statistical significance set at a criterion of $p < .001$. For 33 out of 40 items on the Stress Experience subscale, there was a significant ($p < .001$) relationship between group status and endorsement of having experienced the stressor over the past 6 months, with parents in the ADHD group more likely to endorse having experienced the stressor. For 39 out of 40 items on the Stress Experience index, there was a significant relationship at the $p < .01$ level. The only item that was not significant at the $p < .01$ level was disagreements with spouse about managing child behavior ($p = .013$).

Item Analysis - Stress Degree Scale

Tests of normality were conducted to assess the distribution of responses for the Stress Degree index for both groups. Results indicated significant levels of skewness and kurtosis in the distribution of scores across groups, but particularly in the comparison group. Levene's test for equality of variances between groups was also significant for all 40 items. As a result of these preliminary analyses, chi-square analyses were deemed to be more appropriate than t-tests to assess the relationship between item responses and group status. The Bonferroni correction was used once again to control for error rates with statistical significance set at $p < .001$. For 33 out

of 40 items on the Stress Degree subscale, there was a significant ($p < .001$) relationship between group status and degree of stress endorsed, with parents in the ADHD group endorsing higher levels of stress. For 38 out of 40 items on the Stress Degree index, there was a significant relationship at the $p < .01$ level. The two non-significant items were item 11, difficulties dealing with the child's doctors, ($p < .019$) and item 18, disagreements with spouse about managing the child's behavior ($p < .013$). Overall, Cramer's V values, indicating the strength of the association between group status and degree of stress endorsed, ranged from .20 to .55.

DISCUSSION

The aim of the current study was two-fold: 1) to conduct a replication of the Johnson and Reader (2002) study using a separate and larger sample, and 2) to extend these findings by assessing the ability of each of the 40 DBSI items to differentiate between an ADHD and comparison group. The results of this study provide additional support for the adequacy of the Disruptive Behavior Stress Inventory (DBSI) in assessing the presence and degree of potential child behavior-related stress experienced by primary caregivers of children with ADHD.

In terms of reliability, both the Stress Experience and Stress Degree indices of the DBSI were again found to display adequate item-total correlations and strong evidence of internal consistency. Whereas Johnson and Reader (2002) only reported item-total correlations and internal consistency findings for an ADHD sample, the current study looked at both the ADHD sample and the total combined sample (ADHD + comparison group). For the ADHD sample, the mean corrected item-total correlations were .41 for the Stress Experience scale and .49 for the Stress Degree scale, which were slightly lower than those found in the Johnson and Reader (2002) study (.48 and .58, respectively). For the combined ADHD and comparison group sample, the mean corrected item-total correlations were .54 for the Stress Experience scale and .58 for

the Stress Degree scale. These results were similar to unpublished results from the original combined ADHD and comparison group sample (.52 and .62, respectively). Item 18 ("Disagreements with spouse about managing your child's behavior") consistently showed the lowest corrected item-total correlations. This may be due to the fact that not all primary caregivers involved in the study had spouses or partners living in the home. Overall, the results seem reasonably consistent across the two studies and provide further evidence of adequate item-total correlations.

For the ADHD group, both DBSI indices continued to show evidence of strong internal consistency, as evidenced by Cronbach's coefficient alpha of .90 for the Stress Experience index and .93 for the Stress Degree index. These values were just slightly less than the values Johnson and Reader (2002) found in their comparatively smaller ADHD sample (coefficient alphas of .93 and .96, respectively). Internal consistency values for the combined ADHD and comparison group were also strong, with coefficient alphas of .95 for the Stress Experience index and .96 for the Stress Degree index. These results are very similar to unpublished results found by Johnson and Reader in analyses of their original combined sample (coefficient alphas of .94 and .96, respectively).

Overall DBSI scores showed good discriminant validity in differentiating between the ADHD and comparison group. As predicted, mean scores on both the Stress Experience and Stress Degree scales were significantly higher for primary caregivers of children with ADHD compared to caregivers in the comparison group. These results confirmed initial predictions, and replicated the results from the original Johnson and Reader (2002) study. The results are also consistent with previous studies that have found higher levels of stress, assessed by other methods, in primary caregivers of children with ADHD relative to caregivers of children without

ADHD (Baker & McCal, 1995; Breen & Barkley, 1988; Byrne et al., 1998; DuPaul, et al., 2001; Mash & Johnston, 1983).

Additional analyses indicated that primary caregivers of children with ADHD on medication had significantly higher mean stress scores on both DBSI indices when compared to primary caregivers of children with ADHD who were not on medication. In the initial study, Johnson and Reader (2002) also found that both DBSI index scores were generally higher for the medicated group but differences failed to reach statistical significance, possibly due to low power. A possible explanation for the present somewhat counterintuitive findings was proposed by Johnson and Reader (2002). They suggested that children with ADHD who are and are not medicated may differ in the initial severity of their symptoms, with children prescribed medication having more severe symptoms. They further proposed that although pharmacological treatment may reduce ADHD symptoms, given the initial higher level of symptoms and the fact that prescribed medication may not adequately control symptoms in the late afternoons and evenings, this may not be enough to reduce child behavior problems and family stress levels below the level seen in children/families in the non-medicated group.

The non-equivalency of child gender within the ADHD group (49 boys and 22 girls) seems consistent with research showing that in clinical settings, boys are diagnosed with ADHD more frequently as compared to girls (Barkley, 1998). In our analysis of the ADHD group, the mean DBSI Stress Experience index score was significantly higher for caregivers of boys compared to girls. The Stress Degree index also showed a trend towards higher scores for boys than girls. Child gender was subsequently found to be a statistically significant covariate (explaining approximately 3% of the variance) when group comparisons for the Stress Experience index were considered. In the original 2002 study, child gender was not found to be a

significant covariate, but the analyses lacked sufficient power. Taken together, the results suggest that within the ADHD group, primary caregivers of boys experience more stressors and than primary caregivers of girls. Further analyses with more power are needed to ascertain whether primary caregivers of boys with ADHD find these events to be more stressful than primary caregivers of girls with ADHD. When looking at the significant differences in DBSI stress indices across the ADHD and comparison groups, child gender was found to contribute a relatively small amount of variance, suggesting this factor does not play a major role in the significant differences found between groups.

Having confirmed findings from the initial DBSI investigation (Johnson & Reader, 2002) that stress scores derived from this measure significantly differentiated caregivers of children with and without ADHD, additional analyses were performed using individual DBSI items. Here, chi-square analyses involving responses to individual items from the Stress Experience and Stress Degree scales demonstrated that a large majority of the individual DBSI items differentiated between the ADHD and comparison groups. Indeed, controlling for experiment-wise error rates (Bonferroni correction), 33 of the 40 Stress Experience scale items and 33 of the 40 Stress Degree items were found to discriminate between caretakers of children with and without ADHD at the .001 level. These findings provide strong support, not only for the two DBSI stress scales but also for the vast majority of the individual items making up these scales. These findings provide additional strong support for the psychometric properties of the DBSI.

Despite the positive findings of the present study, there are several limitations of this two-part investigation. The lack of significant participation of male primary caregivers places limitations on the generalizability of the current findings, as male and female primary caregivers may well differ in the nature of stressors they experience and in the degree to which they find

issues related to disruptive child behavior to be stressful. Findings of this study clearly need to be supplemented by subsequent research focusing on differences between male and female primary caregivers. Another limitation relates to the lack of findings regarding differences in DBSI index scores as a function of ADHD subtype, due to the small numbers of children with primarily hyperactive/impulsive and inattentive subtypes. Although the small number of children with the primarily hyperactive/impulsive subtype of ADHD is not surprising, the reason for the significantly lower number of children with the primarily inattentive subtype compared to the 2002 study is unclear. It may be that children with the primarily inattentive subtype of ADHD, who show less externalizing behavior problems, are increasingly being seen and treated by their pediatrician, and therefore less likely to be seen at a specialized ADHD clinic located in a university medical center. More research involving large samples of children with ADHD that vary according to subtype is needed. Finally, the presence of possible comorbid disorders in the ADHD group may be considered at least a potential limitation, in the sense that the DBSI may not have been measuring primary caregiver stress related solely to ADHD behavior but also that resulting from comorbid features. However, if one considers the relatively low rates of "pure" ADHD and the high rates of comorbid disorders such as Oppositional Defiant and Conduct Disorder in the ADHD population (Cantwell, 1996; Jensen, Martin, & Cantwell, 1997; Barkley, 1998), our sample is likely to be reasonably representative of ADHD cases seen in clinical settings.

Overall, the results of this study are consistent with the major findings of the original study by Johnson and Reader (2002) in providing additional support for the adequacy of the DBSI Stress Experience and Stress Degree scales as measures of ADHD-related family stress. They also provide support for the large majority of specific DBSI items in terms of their ability

to discriminate between ADHD and non ADHD groups. Such findings, taken together, suggest that the continued evaluation and development of the DBSI is warranted. Future directions should include studies designed to assess the relationships between scores on the DBSI and other more established measures thought to assess ADHD-related family stress (such as the PSI) as well as efforts to increase the number of male caregiver respondents. Evaluating the relationship between comorbid disruptive behavior disorders and scale scores on the DBSI as well as conducting factor analytic studies designed to define relevant dimensions of parenting stress would also provide important data. Obtaining normative data sufficient to derive clinical cut-off scores would also seem to be essential if the measure is to be used clinically. Considering that research indicates that an increased level of parenting stress is associated with having a child displaying significant externalizing behavior (Baker & Heller, 1996; Donenberg & Baker, 1993), studies designed to demonstrate the usefulness of this measure with primary caregivers of children with other types of disruptive disorders would also seem desirable.

Unlike other measures that assess composite stress levels or stress outcomes, a particular strength of the DBSI lies in its ability to assess the presence and degree of specific stressors experienced by primary caregivers of children with ADHD. Identification of the presence and degree of stressors primary caregivers experience as a result of their child's behavior is important not only for purposes of assessment but also for interventions, in terms of helping caregivers develop more effective ways to cope with the specific stressors they experience as a result of their child's behavior. This may lead to more positive outcomes for families of children with disruptive behavior disorders, and these outcomes can be measured by the DBSI over the course of treatment.

References

American Academy of Child and Adolescent Psychiatry (2007). Practice parameter for the assessment and treatment of children and adolescents with Attention-Deficit/Hyperactivity Disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 46,* 894-921.

American Academy of Pediatrics (2000). Diagnosis and evaluation of the child with attention-deficit/hyperactivity disorder. *Pediatrics, 105,* 1158-1170.

Abidin, R.R. (1995). *Parenting Stress Index: Professional Manual* (3rd ed.). Odessa, FL: Psychological Assessment Resources, Inc.

Anastopoulos, A.D., Guevremont, D.C., Shelton, T.L., & DuPaul, G.J. (1992). Parenting stress among families of children with Attention Deficit Hyperactivity Disorder. *Journal of Abnormal Child Psychology, 20,* 503-520.

Anastopoulos, A.D., Shelton, T.L., DuPaul, G.J., & Guevremont, D.C. (1993). Parent training for Attention Deficit Hyperactivity Disorder: Its impact on parent functioning. *Journal of Abnormal Child Psychology, 21,* 581-596.

Baker, B.L., & Heller, T.L. (1996). Preschool children with externalizing behaviors: Experience of fathers and mothers. *Journal of Abnormal Child Psychology, 24,* 513-532.

Baker, D.B. (1994). Parenting stress and ADHD: A comparison of mothers and fathers. *Journal of Emotional & Behavioral Disorders, 2*, 46-50.

Baker, D.B., & McCal, K. (1995). Parenting stress in parents of children with Attention Deficit Hyperactivity Disorder and parents of children with learning disabilities. *Journal of Child and Family Studies, 4*, 57-68.

Barkley, R.A. (1998). *Attention Deficit Hyperactivity Disorder: A handbook for diagnosis and treatment* (2nd ed.). New York: The Guilford Press.

Befera, M.S., & Barkley, R.A. (1985). Hyperactive and normal girls and boys: Mother-child interaction, parent psychiatric status and child psychopathology. *Journal of Child Psychology and Psychiatry, 26*, 439-532.

Breen, M.J., & Barkley, R.A. (1988). Child psychopathology and parenting stress in girls and boys having Attention Deficit Disorder with Hyperactivity. *Journal of Pediatric Psychology, 13*, 265-280.

Brown, R.T., & Pacini, J.N. (1989). Perceived family functioning, marital status, and depression in parents of boys with Attention Deficit Disorder. *Journal of Learning Disabilities, 22*, 581-587.

Byrne, J.M., DeWolfe, N.A., & Bawden H.N. (1998). Assessment of Attention-Deficit Hyperactivity Disorder in preschoolers. *Child Neuropsychology, 4*, 49-66.

Cantwell, D.P. (1996). Attention Deficit Disorder: A review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry, 35*, 978-987.

Cohen, J. (1988). *Statistical power analysis in the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Conners, C.K. (1997). *Conners' Rating Scales – Revised Technical Manual.* North Tonawanda, N.Y.: Multi-Health Systems, Inc.

Crnic, K.A., & Acevedo, M. (1995). Everyday stresses and parenting. In M.H. Bornstein (Ed.), Handbook of parenting: Vol. 4. *Applied and practical parenting* (pp. 277-297). Mahwah, NJ: Erlbaum.

Crnic, K.A., & Greenberg, M.T. (1990). Minor parenting stresses with young children. *Child Development, 61,* 1628-1637.

Cunningham, C.E., Benness, B.B., & Siegel, L.S. (1988). Family functioning, time allocation, and parental depression in the families of normal and ADDH children. *Journal of Clinical Child Psychology, 17*, 169-177.

Donenberg, G., & Baker, B.L. (1993). The impact of young children with externalizing behaviors on their families. *Journal of Abnormal Child Psychology, 21,* 179-198.

DuPaul, G.J., McGoey, K.E., Eckert, T.L., & VanBrakle, J. (2001). Preschool children with Attention-Deficit/Hyperactivity Disorder: Impairments in behavioral, social, and school functioning. *Journal of the American Academy of Child and Adolescent Psychiatry, 40,* 508-515.

Forehand, R., Furey, W.M., & McMahon, R.J. (1984). The role of maternal distress in a parent training program to modify child non-compliance. *Behavioural Psychotherapy, 12,* 93-108.

Griest, D.L., Forehand, R., Breiner, J.L., Rogers, T., Furey, W., and Williams, C.A. (1982). Effects of parent enhancement therapy on the treatment outcome and generalization of a behavioral parent training program. *Behavior Research and Therapy, 20,* 429-436.

Harrison, C., & Sofronoff, K. (2002). ADHD and parental psychological distress: Role of demographics, child behavioral characteristics, and parental cognitions. *Journal of the American Academy of Child and Adolescent Psychiatry, 41*, 703-711.

Jensen, P.S., Martin, D., & Cantwell, D.P. (1997). Comorbidity in ADHD: Implications for research, practice, and DSM-V. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36,* 1065-1079.

Johnson, J.H., & Reader, S.K. (2002). Assessing stress in families of children with ADHD: Preliminary development of the Disruptive Behavior Stress Inventory (DBSI). *Journal of Clinical Psychology in Medical Settings*, *9,* 51-62.

Johnston, C. (1996). Parent characteristics and parent-child interactions in families of nonproblem children and ADHD children with higher and lower levels of Oppositional Defiant Behavior. *Journal of Abnormal Child Psychology, 24*, 85-104.

Johnston, C., & Mash, E.J. (2001). Families of children with Attention-Deficit/Hyperactivity Disorder: Review and recommendations for future research. *Clinical Child and Family Psychology Review, 4*, 183-207.

Mash, E.J., & Johnston, C. (1983). Parental perceptions of child behavior problems, parenting self-esteem, and mothers' reported stress in younger and older hyperactive and normal children. *Journal of Consulting and Clinical Psychology, 51*, 86-99.

Mash, E.J., & Johnston, C. (1990). Determinants of parenting stress: Illustrations from families of hyperactive children and families of physically abused children. *Journal of Clinical Child Psychology, 19*, 313-328.

Podolski, C., & Nigg, J.T. (2001). Parent stress and coping in relation to child ADHD severity and associated child disruptive behavior problems. *Journal of Clinical Child Psychology, 4*, 503-513.

Webster-Stratton, C. (1990). Stress: A potential disruptor of parent perceptions and family interactions. *Journal of Clinical Child Psychology, 19*, 302-312.

Yates, F. (1934). Contingency table involving small numbers and the χ^2 test. *Supplement to the Journal of the Royal Statistical Society, 1*, 217-235.

Appendix: Disruptive Behavior Stress Inventory (DBSI)

Listed below are a range of potential stressors that are sometimes experienced as a result of having a child who displays behavioral difficulties. Read each of the following items carefully and indicate those situations you have experienced as a result of your child's behavior during the past six months. **Circle "Yes" if you have experienced what is described in the item. Circle "No" if you have not**. **For each item where you circled "Yes", indicate on the following 4 point scale the extent to which it is stressful to you**: 0 (Not at all Stressful); 1 (Somewhat Stressful); 2 (Moderately Stressful); 3 (Very Stressful). Please be sure to respond to each item.

		Experienced Event?		Not at all Stressful	Somewhat Stressful	Moderately Stressful	Very Stressful
1.	Not being able to leave your child with a baby-sitter.	Yes	No	0	1	2	3
2.	Not being able to go out to eat because of your child's behavior.	Yes	No	0	1	2	3
3.	Being interrupted by your child when trying to take care of other children.	Yes	No	0	1	2	3
4.	Having to miss or leave church because of your child's behavior.	Yes	No	0	1	2	3
5.	Dealing with teachers' complaints about your child.	Yes	No	0	1	2	3
6.	Difficulties finding professional services for your child.	Yes	No	0	1	2	3
7.	Having to miss work because of your child's problems.	Yes	No	0	1	2	3
8.	Not being able to take your child shopping because of his/her behavior.	Yes	No	0	1	2	3
9.	Not able to spend enough time with your other children.	Yes	No	0	1	2	3
10.	Dealing with your child's academic difficulties.	Yes	No	0	1	2	3
11.	Difficulties dealing with your child's doctors.	Yes	No	0	1	2	3
12.	Difficulties getting your child to appointments with various professionals.	Yes	No	0	1	2	3
13.	Spending an excessive amount of time helping your child with homework.	Yes	No	0	1	2	3
14.	Not having enough time for yourself because of your child's behavior.	Yes	No	0	1	2	3
15.	Having to explain your child's behavior to others.	Yes	No	0	1	2	3
16.	Difficulties getting school-based services for your child.	Yes	No	0	1	2	3
17.	Not knowing how to deal with your child's behavior.	Yes	No	0	1	2	3
18.	Disagreements with spouse about managing your child's behavior.	Yes	No	0	1	2	3
19.	Problems paying for services your child needs.	Yes	No	0	1	2	3
20.	Dealing with your child's conflicts with other children.	Yes	No	0	1	2	3
21.	Calls from school regarding your child's behavior problems.	Yes	No	0	1	2	3
22.	Having to watch your child so he/she doesn't get into trouble.	Yes	No	0	1	2	3
23.	Dealing with complaints from other parents about your child's behavior.	Yes	No	0	1	2	3
24.	Having to miss important social events because of your child's behavior.	Yes	No	0	1	2	3
25.	Not being able to get to bed at a decent hour because of child's behavior.	Yes	No	0	1	2	3
26.	Dealing with complaints from neighbors about your child's behavior.	Yes	No	0	1	2	3
27.	Being concerned about your child being injured.	Yes	No	0	1	2	3
28.	Not getting work done at home because of your child's behavior.	Yes	No	0	1	2	3
29.	Other people telling you how to parent your child.	Yes	No	0	1	2	3
30.	Problems related to medication side effects (i.e. drowsiness, headaches, etc).	Yes	No	0	1	2	3
31.	Not knowing how to explain your child's behavior to others.	Yes	No	0	1	2	3
32.	Not being able to work outside home because of your child's behavior.	Yes	No	0	1	2	3
33.	Conflicts with your child over homework.	Yes	No	0	1	2	3
34.	Calls from school regarding your child's academic problems.	Yes	No	0	1	2	3
35.	Getting complaints from school bus driver.	Yes	No	0	1	2	3
36.	Having less time with partner because of your child's behavior.	Yes	No	0	1	2	3
37.	Not getting support from others in dealing with your child's problems.	Yes	No	0	1	2	3
38.	Being unable to take your child to public places.	Yes	No	0	1	2	3
39.	Difficulties finding adequate after school placement for your child.	Yes	No	0	1	2	3
40.	Having your child embarrass you in front of others.	Yes	No	0	1	2	3

Table I. Demographic Data

	Replication			Extension		
	n	*M*	*SD*	*n*	*M*	*SD*
Child Age						
Comparison	79	8.19	2.25	118	8.17	2.58
ADHD	71	8.21	2.53	124	8.70	2.66
Child Gender						
Comparison						
Boys	39			60		
Girls	40			58		
ADHD						
Boys	49			94		
Girls	22			30		
Parent Age						
Comparison	79	37.37	6.91	118		
ADHD	71	37.37	10.09	124		
Parent Gender						
Comparison						
Female	68			103		
Male	11			15		
ADHD						
Female	68			113		
Male	3			11		

Table II. DBSI Mean Subscale Scores Across ADHD and Comparison Groups

Scale	Comparison		ADHD			
	M	*SD*	*M*	*SD*	*F* (1)	Cohen's *f*
Stress Experience	7.47	7.17	20.45	8.34	94.95***	.84
Child gender					4.09*	
Stress Degree	11.39	14.50	40.45	22.92	80.22***	.77
Child gender					1.54	

Note. Cohen's *f* = effect size
*$p < .05$ ***$p < .001$

Table III. DBSI Subscale Scores For Parents of Children On Versus Off ADHD Medication

Subscale	On Medication		Off Medication			
	M	*SD*	*M*	*SD*	*F* (1)	Cohen's *f*
Stress Experience	21.92	8.02	17.00	8.46	5.36*	.28
Stress Degree	44.63	23.49	31.29	19.40	5.24*	.28

Note. Cohen's *f* = effect size.
*$p < .05$

Table IV. Chi-square Analyses for Stress Experience and Stress Degree Subscale Items

	Stress Experience		Stress Degree		
DBSI Item	***n***	**χ^2 with Continuity Correction**	***n***	**Pearson χ^2**	**Cramer's V**
1	240	10.67**	242	13.49**	.24
2	242	22.91***	242	30.43***	.36
3	242	7.86**	241	25.12***	.32
4	239	8.30**	238	12.67**	.23
5	242	43.97***	242	62.28***	.51
6	240	41.14***	240	38.37***	.40
7	242	18.84***	242	25.41***	.32
8	242	35.20***	242	38.43***	.40
9	241	10.99***	239	12.18**	.23
10	242	59.72***	240	72.55***	.55
11	241	10.89**	240	10.78	.21
12	242	24.65***	241	26.58***	.33
13	241	52.92***	241	68.28***	.53
14	241	35.41***	241	39.97***	.41
15	241	62.63***	240	58.64***	.49
16	241	52.15***	240	45.92***	.44
17	239	28.15***	239	36.72***	.39
18	241	6.21	240	9.96	.20
19	242	22.59***	241	20.02***	.29
20	242	13.04***	241	18.02***	.27
21	241	42.47***	241	53.21***	.47
22	242	55.13***	241	64.71***	.52
23	242	32.06***	242	31.95***	.36
24	242	26.99***	241	28.05***	.34
25	241	15.29***	240	18.98***	.28
26	242	14.53***	242	15.76***	.26
27	242	19.15***	240	25.29***	.33
28	241	32.44***	241	35.64***	.39
29	242	12.11**	240	16.19***	.26
30	242	41.40***	242	40.87***	.41
31	241	41.16***	240	44.47***	.43
32	242	15.94***	242	17.18**	.27
33	241	34.82***	240	64.23***	.52
34	241	52.27***	241	52.35***	.47
35	242	15.20***	242	18.29***	.28
36	240	13.88***	239	18.87***	.28
37	241	36.96***	240	38.78***	.40
38	241	35.59***	241	36.17***	.39

39	242	6.91**	241	12.38**	.23
40	242	31.93***	241	39.30***	.40

Note. SE subscale *df* = 1 ; SD subscale *df* = 3
**$p < .01$ ***$p < .001$