Assessing ADHD-Related Family Stressors with the DBSI:

A Replication and Extension

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The work reported in the attached paper entitled Assessing ADHD-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 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 primary caregivers of children with and without a 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 primary caregivers of children with and without a history of 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 primary caregivers of children with and without a history of ADHD.

KEY WORDS: ADHD, parent, family, stress, children
Assessing ADHD-Related Family Stressors with the DBSI: A Replication and Extension

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, problems interacting with peers, a higher risk for unintentional injury, and engage in many behaviors that result in significant stress for primary 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 emphasized that even everyday parenting events are significant sources of stress for caregivers of normal children (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 comparing ADHD and normal control groups, mostly focusing on mothers and using the Parenting Stress Index (PSI; Abidin, 1995), suggest that parents of children with ADHD display higher levels of parenting stress, particularly on the Child Domain subscales of the PSI (Baker & McCal, 1995; Breen & Barkley, 1988; Byrne, DeWolfe, & Bawden, 1998; DuPaul, McGoey, Eckert, & VanBrakle, 2001; Mash & Johnston, 1983). Several studies lacking a control group have also examined PSI scores in ADHD samples, and have consistently found clinically elevated scores on the Child Domain of the PSI (Anastopoulos, Shelton, DuPaul, & Guevremont, 1993; Anastopoulos, Guevremont, Shelton, & DuPaul, 1992; Baker, 1994; Harrison & Sofronoff, 2002; Treacy, Tripp, & Baird, 2005; van den Hoofdakker et al., 2007; Yang, Jong, Hsu, & Tsai, 2007). Results from studies examining PSI Parent Domain scores in ADHD samples have shown mixed findings, with some studies indicating clinically elevated stress levels (Byrne et al., 1998; Treacy et al., 2005) and other studies reporting scores in the normative range (Baker, 1994; Baker & McCal, 1995; Anastopoulos et al., 1993). Several studies using measures other than the PSI have also found significantly higher stress levels in parents of children with ADHD compared to parents of normal control children. Kadesjo, Stenlund, Wels, Gillberg, and Hagglof (2002) translated the Nijmegen Child-Rearing Situation Questionnaire (NCSQ), a Dutch parent-report questionnaire
assessing subjective stress, attributions of child-rearing outcomes, and expectations for help, into Swedish and found that mothers in the ADHD group had significantly higher stress scores compared to mothers in the normal control group. Lange et al. (2005) used the Family Inventory of Life Events and Changes (FILE) as a measure of stress to compare parents of boys with ADHD, parents of boys with an emotional disorder (depression or anxiety), and parents of normal control boys. They found significantly higher stress for parents in the ADHD and emotional disorder groups compared to the normal control group.

Studies have also shown that parents of children with ADHD often exhibit higher levels of adjustment problems (Johnston & Mash, 2001). Some research has suggested that parents 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 parenting efficacy (Johnston, 1996; Mash & Johnson, 1983), and lower levels of satisfaction in the parenting role (Mash & Johnston, 1983; Podolski & Nigg, 2001) compared to normative samples. Likewise, studies have found significant levels of marital discord and strained interpersonal relationships in families of children with ADHD (Befera & Barkley, 1985; Brown & Pacini, 1989; Johnston, 1996). Existing evidence also seems consistent with the notion that the negative behaviors of children with ADHD and concurrent parenting stress and negative mood can elicit maladaptive parenting behaviors (Gerdes et al., 2007; Mash & Johnston, 1990), which in turn can lead to further disruptive child behaviors and a coercive cycle of family functioning (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 parenting stress and maternal depression are related to a lower likelihood that parents will complete behavioral management training programs for ADHD and
general child behavior problems (Chacko et al., 2007; Forehand, Furey, & McMahon, 1984; Friars & Mellor, 2007). 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)*

Most studies investigating ADHD-related caregiver stress levels have used the PSI (Johnston & Mash, 2001). The PSI (Abidin, 1995) is a psychometrically-sound and widely utilized parent-report measure designed to assess sources of strain on the parent-child relationship, including that resulting from child behavior (Child Domain), from parent characteristics (Parent Domain), and from life stress factors. The Child Domain index assesses characteristics of the child (e.g., hyperactivity and inattention, mood, demandingness), while the Parent Domain index assesses characteristics of the parent (e.g., feelings of competency, role restriction, isolation, attachment to child) that can place strain on the parent-child system. While the PSI has proven to be a useful clinical and research measure (Johnston & Mash, 2001), it appears to have limitations as regards the assessment of those specific stressors experienced by caregivers of children with ADHD. First, a number of the Child Domain subscales assess disruptive child behaviors that overlap with ADHD symptoms, leading to the possible confounding of symptoms of ADHD and other disruptive behaviors and “parenting stress” (Anastopoulos et al., 1992). Likewise, several scales in the Parent Domain, such as those assessing depression, relationship with spouse, feelings of competency, and the like are perhaps more reflective of stress-related *outcomes* rather than stressors per se.
While previous research with the PSI suggests that parents of children with ADHD obtain higher “parenting stress” scores than those with children without this disorder (Johnston & Mash, 2001), the PSI appears less than optimal as a measure of specific ADHD-related stressors. As such, our earlier research on the development of the Disruptive Behavior Stress Inventory (DBSI; Johnson & Reader, 2002) was based on the assumption that a more useful measure would be one designed to assess the occurrence and impact of the range of specific behavior-related stressors that result from having a child with ADHD, and not confounded with symptoms of ADHD and family variables reflective of stress-related outcomes.

Such a measure, patterned after child and adult life stress measures (Johnson, 1986; Johnson & McCutcheon, 1980; Sarason, Johnson, & Siegel, 1978), was seen as being of value as 1) a research tool for studying the relationships between behavior-related family stressors and indices of family functioning, 2) a clinical assessment measure to assess the level of ADHD-related parent stress in families of children being seen for ADHD evaluations, and 3) a treatment outcome measure to determine the extent to which interventions with children with ADHD result in concurrent reductions in parent stress. The delineation of meaningful empirically-derived dimensions of ADHD-related stress through subsequent research also promises to make the DBSI well suited for delineating specific targets for stress management interventions in families of children with ADHD.

Based on the above rationale, 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 rating for each item experienced.

In their initial study, Johnson and Reader (2002) conducted reliability analyses on their ADHD sample of 55 parents and 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, based on Nunnally’s assertion that item-total correlations above .30 are considered good (Nunnally, 1978). Group comparisons revealed that primary caregivers of children with ADHD experienced a significantly higher number of stressors on the Stress Experience subscale, and had 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. Whalen et al. (2006) administered the DBSI in their study that used electronic diaries to map the challenges of daily family life for mothers and children coping with ADHD. Consistent with results from the Johnson and Reader (2002) study, they found significantly higher scores on both DBSI
subscales for mothers of children in the ADHD group compared to mothers of children in a non-
ADHD comparison group.

*Current Study and Hypotheses*

The present research was designed to expand on the Johnson and Reader (2002) study and further evaluate the adequacy of the DBSI as a measure of family stressors occurring as a result of having a child with ADHD. 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. In addition to conducting reliability analyses on the ADHD sample (replicating the 2002 study), this study also conducted reliability analyses on the ADHD + comparison group combined sample. It was hypothesized that both DBSI subscales would continue to show adequate mean item-total correlation values and strong internal consistency values for both the ADHD-only group and the combined ADHD + comparison group. It was also hypothesized that both DBSI subscale scores would be significantly higher for the ADHD group compared to the comparison control group. The second purpose of this study was to conduct item-level analyses of both DBSI indices to assess the ability of each item on the Stress Experience and Stress Degree subscales to differentiate between primary caregivers of children with and without a history of ADHD. Such item-discrimination analyses represented an attempt to go beyond simply replicating the validity findings of the Johnson and Reader (2002) study by also assessing the discriminant validity of individual DBSI items. Findings of these item-level analyses, combined with the results of item-total correlation analyses, were seen as potentially providing information regarding the need to refine the DBSI, should specific items both fail to differentiate between groups ($p > .01$) and display low item-total correlations (below .30) when examined in the combined sample (ADHD
It was hypothesized that, after controlling for experiment-wise error rates, the large majority of items on both DBSI subscales would significantly differentiate between groups, with caregivers in the ADHD group being more likely than caregivers in the comparison group to endorse having experienced the stressor and having felt a higher degree of stress.

**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 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 with a student population representative of the state’s socioeconomic and racial-ethnic composition.

The ADHD 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 and 15 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). The mean age of children in this group was 8.19 ($SD = 2.25$), with a range 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 primary caregivers of children with ADHD and caregivers 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 being prescribed 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. The mean age of children in this group was 8.17 ($SD = 2.58$), with a range of 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). These values were slightly lower than those found in the Johnson and Reader (2002) study (.48 and .58, respectively), but still well above the .30 criteria set by Nunnally (1978) for adequate item-total correlations. For this sample, six items on the Stress Experience subscale (items 18, 3, 34, 13, 10, and 4) and two items on the Stress Degree subscale (items 18 and 9) had individual item-total correlations that fell below .30. 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). These results were similar to unpublished results from the Johnson and Reader (2002) combined ADHD and comparison group sample (.52 and .62, respectively). No individual item-total correlation value fell below .30 in the ADHD + comparison group sample for either DBSI subscale. Across both DBSI indices for the ADHD-only and ADHD + 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 DBSI 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. These values were consistent with the strong values Johnson and Reader (2002) found in their comparatively smaller ADHD sample (coefficient alphas of .93 and .96, respectively). 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. These high values were very similar to unpublished results found by Johnson and Reader (2002) in analyses of their original combined sample (coefficient alphas of .94 and .96, respectively).

**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 caregivers of children in the comparison group. 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 was no significant difference 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 for the Stress Experience scale 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 \((M = 7.47, SD = \ldots \)
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 for the Stress Degree scale 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 in 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 number 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 $2 \times 2$ tables were less than 5 for some items. The expected cell count was not less than 5 for any of the $2 \times 2$ 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 caregivers 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 item 18, which pertained to 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 included item 11, difficulties dealing with the child’s doctors ($p < .019$) and item 18, disagreements with spouse about managing child 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

Summary of Findings

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 caregivers of children with and without a history of ADHD. The results of this study provide additional support for the adequacy of the DBSI in assessing the presence and degree of potential child behavior-related stressors experienced by primary caregivers of children with ADHD.

In terms of reliability, both the Stress Experience and Stress Degree indices of the DBSI were found to display adequate mean item-total correlations across both the ADHD sample and the total combined sample (ADHD + comparison group). These results were consistent with our
Assessing ADHD-related hypotheses. For the ADHD sample, the mean corrected item-total correlations were slightly lower than those found in the Johnson and Reader (2002) study, but still well above Nunnally’s (1978) .30 criteria for adequate values. For the combined ADHD and comparison group sample, the mean corrected item-total correlations were also above Nunnally’s criteria and similar to unpublished results from the original combined ADHD and comparison group sample. 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, or the possibility that this particular stressor does not significantly discriminate between parents who do or do not have a child with ADHD. As hypothesized, both DBSI indices continued to show evidence of strong internal consistency across both the ADHD-only and ADHD + comparison group samples, with Cronbach coefficient alpha values consistent with the original study (Johnson and Reader, 2002). Overall, the results of reliability analyses seem reasonably consistent across the two studies and provide further evidence of the psychometric strengths of the DBSI.

Overall, both DBSI indices 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 replicated the results from the original Johnson and Reader (2002) study, and 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 scale scores were generally higher for the medicated group but differences failed to reach statistical significance, possibly due to low power. These somewhat counterintuitive findings may be related to the possibility that children with ADHD who are and are not medicated differ in the initial severity of their symptoms, with children prescribed medication having more severe symptoms. 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. Further studies are needed to clarify the relationship between child ADHD medication status and parenting stress levels, including longitudinal studies that can evaluate treatment effects on parental psychosocial adjustment over time.

The non-equivalency of child gender within the ADHD group is 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. Findings regarding gender differences on the Stress Degree index were non-significant. Child gender was subsequently found to be a statistically significant covariate when group comparisons for the Stress Experience index were considered, but was found to contribute only a relatively small amount of variance, suggesting this factor does not play a major role in the significant stress-
related differences found between groups. 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.

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 a history of 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, with caregivers in the ADHD group more likely to endorse having experienced the stressor and a higher level of stress. 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 groups at the $p < .001$ level. These findings supported the study hypotheses and add to the psychometric strength of the DBSI by providing strong support for the vast majority of the individual items making up the two DBSI scales. Item 18, pertaining to disagreements between spouses about managing their child’s behavior, was the only item across both DBSI subscales that did not significantly differentiate between groups. Although this item also had the lowest item-total correlation values on both DBSI subscales in the reliability analyses, the values did not fall below Nunnally’s .30 criteria for the ADHD + comparison sample. Although the removal of
item 18 is considered premature at this time, these results suggest that this item may need to be evaluated in further studies in the context of scale refinement.

Limitations and Future Directions

There are several limitations of this two-part investigation that in turn point to the need for further studies. 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 fact that this study did not examine the relative impact of comorbid disorders in the ADHD group represents another limitation of this study, in the sense that the DBSI may not have been measuring primary caregiver stress related solely to ADHD behavior but also
Assessing ADHD-related stress resulting from comorbid features. If one considers the relatively low rates of "pure" ADHD and the high rates of comorbid conditions in the ADHD population (AACAP, 2007; Barkley, 1998; Cantwell, 1996; Jensen, Martin, & Cantwell, 1997), our sample is likely to be ecologically representative in terms of similarity to ADHD cases seen in clinical settings. Having said that, it is necessary for future research with the DBSI to address this issue through investigations that include both children with only ADHD and children with ADHD and comorbid conditions. Several studies suggest that comorbid disruptive behaviors (e.g., oppositional-defiant and aggressive behaviors) contribute a significant amount of variance towards parenting stress levels, sometimes over and above that attributed to ADHD symptoms (Anastopoulos et al., 1992; Bussing, Gary, Mason, Leon, Sinha, & Garvan, 2003; Podolski & Nigg, 2001; Vitanza & Guarnaccia, 1999). Several studies have also found significantly higher stress levels for parents of children with ADHD and comorbid Oppositional Defiant Disorder and/or Conduct Disorder compared to parents of children with only ADHD (Kadesjo et al., 2002; Ross, Blanc, McNeil, Eyberg, & Hembree-Kigin, 1998). Given these research findings, similar findings would be expected with stress being assessed by the DBSI.

An additional future area of study involving the DBSI should include evaluating the concurrent validity of the measure by assessing the relationships between scores on the DBSI and other more established measures thought to assess parenting stress (such as the PSI). Conducting factor analytic studies designed to define relevant dimensions of parenting stress would also be useful in terms of delineating more specific target areas for assessment and intervention. Obtaining normative data on the DBSI would also seem to be essential to the further development of this measure. Here, it can be noted that while this measure was developed primarily for use with families of children with ADHD (and perhaps other disruptive behavior
disorders), families of children without ADHD or other clinical diagnoses also experience many of the stressors highlighted by DBSI items. In the current study, 10 out of 40 items on the DBSI had over 30% of parents of children in the comparison group endorsing having experienced the stressor. Examples included disagreement with spouse about child’s behavior (46.8%), dealing with teacher complaints about your child (39.5%), having other people tell you how to parent your child (37.9%), and having your child embarrass you in front of others (33.9%). Other items such as not being able to take your child shopping (24.2%) and not being able to leave your child with a baby sitter (23.4%) were also found to occur with some frequency. Normative data for parents and children across gender and different ages is required to provide clinicians with a comparative reference upon which to assess for clinically significant levels of parenting stress.

**Clinical Implications**

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 individual DBSI items in terms of their ability to discriminate between primary caregivers of children with and without a history of ADHD. Such findings, taken together, suggest that the continued evaluation and development of the DBSI is warranted.

Parenting stress has been linked, often together with maternal depression, with multiple negative outcomes including maladaptive parenting behaviors (Gerdes et al., 2007; Mash & Johnston, 1990) and a lower likelihood that parents will complete behavioral management training programs for ADHD and other child behavior problems (Chacko et al., 2007; Forehand, Furey, & McMahon, 1984; Friars & Mellor, 2007). The DBSI shows the potential to be useful in
identifying caregivers at greater risk for maladaptive parenting behaviors and premature termination from treatment. These caregivers may be specific candidates for parenting stress management training programs (Treacy et al., 2005) or enhanced behavior management programs that specifically attempt to help parents address treatment barriers and teach problem-solving skills to cope with stressors, such as the recent STEPP program developed by Chacko and colleagues (2007). 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. This level of specificity in assessment can lead to more tailored and specific interventions for particular stressors. The DBSI also has the potential of serving as a treatment outcome measure for these specific parent interventions and other interventions for ADHD (e.g., stimulant medication treatment), and other disruptive behavior disorders (e.g., Parent Child Interaction Therapy for Oppositional Defiant Disorder and Conduct Disorder).
References


