Published in final edited form as:
School Ment Health. 2010 March 1; 2(1): 3–12. doi:10.1007/s12310-009-9021-x.

Assessing Homework Problems in Children with ADHD: Validation of a Parent-Report Measure and Evaluation of Homework Performance Patterns

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Abstract

The factor structure of a parent-report measure of child homework problems, the Homework Problems Checklist, was examined in a geographically and ethnically diverse sample of children with Attention-Deficit/Hyperactivity Disorder (ADHD). This measure was completed by the parents of 579 children ages 7.0-9.9 diagnosed with ADHD Combined Type as part of the Multimodal Treatment Study of Children with ADHD (MTA). Results replicated previous work showing two salient factors that measure homework completion behaviors (Factor I) and homework management behaviors (Factor II). This two-factor solution remained consistent when examined across child sex and ethnicity subgroups. Analysis of patterns revealed that homework problems are greater for children in higher grades and that children with ADHD and comorbid Learning Disabilities experience significantly more homework problems than children with ADHD alone. This study also replicated previous work showing that homework problems and ADHD inattentive symptoms are highly correlated whereas correlations between homework problems and hyperactivity and impulsivity are low to moderate. Implications of the findings for the assessment of homework problems in children with ADHD and for intervention are discussed.

Keywords

MTA; ADHD; Academic; Impairment; Homework; Assessment; Measurement

Attention-Deficit/Hyperactivity Disorder (ADHD) is the most common neurobehavioral disorder in children with prevalence rates ranging from 3% to 10% (Brown et al., 2001; Froehlich et al., 2007). Children with ADHD experience significant impairment across multiple domains of functioning and throughout the developmental lifespan (Barkley,

Fischer, Smallish, & Fletcher, 2002; Biederman, 2005). Poor academic achievement is arguably the most serious difficulty faced by children who meet criteria for ADHD (DuPaul & Stoner, 2003; Massetti et al., 2008). Compared to their peers, children with ADHD have significantly lower standardized achievement test scores and school grades (Frazier, Youngstrom, Glutting, & Watkins, 2007) and experience higher rates of academic failure and school dropout (Barkley, Fischer, Edelbrock, & Smallish, 1990; DuPaul & Stoner, 2003; Epstein, Polloway, Foley, & Patton, 1993). In fact, although ADHD symptoms decline with increased chronological age (Biederman, Mick, & Faraone, 2000 & Hart, Lahey, Loeber, Applegate, & Frick, 1995), academic impairments persist and may increase as children progress through school (Massetti et al., 2008; Wolraich et al., 2005).

Homework and Academic Achievement

Difficulties with homework management and completion contribute to the academic problems experienced by children with ADHD. Children with ADHD have significantly more homework difficulties than their classroom peers (Epstein et al., 1993; Lahey et al., 1994; Power, Werba, Watkins, Angelucci, & Eiraldi, 2006). Children with ADHD are more likely than their peers to forget to bring materials from school to home and vice versa, to have homework assignments recorded inaccurately, to procrastinate when completing homework assignments, and to have left work incomplete (Evans et al., 2009; Langberg, Epstein, Urbanowicz, Simon, & Graham, 2008; Power et al., 2006). Children with ADHD often have disorganized school binders, bookbags, lockers, and desks and as a result, frequently lose and cannot find homework materials (Evans et al., 2009; Langberg et al., 2008; Zentall, Harper & Stormont-Spurgin, 1993). Further, when completing homework, children with ADHD often have difficulties staying on-task, rush through their assignments and make careless mistakes (Epstein et al., 1993; Power, Karustis, & Habboushe, 2001).

In the United States, homework completion is a major component of the educational curriculum (West Chester Institute for Human Services Research, 2002) and is positively correlated with school grades and achievement test scores (Cooper, Lindsay, Nye, & Greathouse, 1998; Cooper, 1989). The relationship between homework and academic achievement is moderated by grade in school and is stronger in secondary school (i.e. grades 7-12) than in elementary school (Cooper, Robinson, & Patall, 2006). Homework also serves to facilitate family involvement in education (Olympia, Sheridan, Jenson, & Andrews, 1994) which is a strong predictor of children's academic achievement (Fantuzzo, McWayne, Perry, & Childs, 2004). Accordingly, the homework difficulties that children with ADHD experience are an important area for research and intervention.

Measuring Homework Problems

Children with ADHD often experience difficulties with at least one homework-related behavior that ultimately results in poor homework performance (Power et al., 2006). For example, a child may record homework assignments inaccurately or not at all, mismanage materials, be off-task during homework completion, or have a combination of these difficulties. A reliable and valid measure of homework performance that identifies specific areas of deficit and thoroughly assesses homework behavior is necessary to inform intervention strategy. The Homework Problem Checklist (HPC) is a commonly used instrument for assessing children's homework performance (Anesko, Schoiock, Ramirez, & Levine, 1987). Several studies support this 20-item, parent-report measure as an adequate screening and outcome tool that encompasses a variety of behaviors that are integral to successful completion of homework (Anesko et al., 1987; Epstein et al., 1993; Lahey et al., 1994).

Until recently, the HPC was treated as a single factor instrument that broadly assessed the construct of homework performance. To evaluate the accuracy of this assumption, Power et al. (2006) examined the factor structure of the HPC in a sample of general education students (N = 675) and in a clinic-based sample (N = 356). Seventy-one percent of the children in the clinic-based sample met diagnostic criteria for ADHD according to the parent completed Diagnostic Interview for Children and Adolescents (DICA-R-P; Reich, Shayka, & Taibleson, 1995). Exploratory factor analysis suggested that the HPC measures two distinct aspects of homework performance. These factors were extracted both in the general education sample and the clinic sample (Power et al., 2006).

Factor I relates to problems that occur during homework completion. For example, parents rate their child's efficiency of work completion, distractibility, inattention, and the parent-child interactions that occur during homework completion. Factor II relates predominately to homework management behaviors. For example, parents rate their child's consistency in recording homework and in bringing home the necessary school materials. Both HPC factors have moderate to high correlations with the Inattention subscale of the Behavior Assessment Scale for Children (BASC; Reynolds & Kamphaus, 1992) parent version and low to moderate correlations with the Hyperactivity subscale (Power et al., 2006).

The Power et al. (2006) factor analysis findings have not been replicated. A replication study is important because of a number of limitations related to the geographic and ethnic diversity of the sample. First, the ADHD sample was from a single clinic in the Northeast, significantly limiting geographic diversity. Second, the ethnic diversity of the sample was relatively limited (African American 13% and Latino 3%). Third, while Power et al. (2006) found that boys with ADHD had significantly more homework problems than girls, the sample had an insufficient number of girls to test the stability of the factor structure across sex. Finally, Intelligence Quotient (IQ) and Standardized Achievement Test Score data were not available and the contribution of Learning Disabilities to the identified homework problems could not be evaluated.

The primary purpose of this study is to explore patterns of parent-reported homework problems in a geographically and ethnically diverse sample of children with ADHD. The NIMH Multimodal Treatment Study of Children with ADHD (MTA) sample examined in this study is geographically (six sites) and ethnically (38% minority) diverse and allows for evaluation of parent-reported homework problems across ethnic subgroups. A secondary goal of this study is to evaluate factors other than ethnicity that may be associated with homework problems in children with ADHD. There is some evidence to suggest that higher homework problem ratings (more severe problems) are associated with ADHD symptoms of inattention (Power et al., 2006), grade in school (Power et al., 2006) and male sex (Anesko et al., 1987; Power et al., 2006). Accordingly, this study will examine the relationship between parent-rated homework problems and child sex, grade in school, and parent- and teacher-rated symptoms of ADHD. Further, while it has been demonstrated that children with learning problems (Epstein et al., 1993) and children with ADHD (Lahey et al., 1994) experience more homework problems than their peers, the impact of ADHD/LD comorbidity has not been examined. This study will test the hypothesis that an additive effect exists (i.e., that children with ADHD/LD comorbidity will exhibit significantly more homework problems than children with ADHD alone after accounting for intelligence).

Method

Participants

The sample for this study is from the NIMH Multimodal Treatment Study of Children with ADHD (MTA; MTA Cooperative Group, 1999). Detailed descriptions of the MTA's

background and rationale, recruitment procedures, assessment and treatment methods, hypotheses, and study design have been reported in other publications (Arnold et al., 1997; Hinshaw et al., 1997; MTA Cooperative Group, 1999). The MTA sample is geographically and ethnically diverse. The 579 participants were recruited from six separate sites across the United States and Canada. Sixty-two percent of the sample is Caucasian, 23% is African-American, 6% is Latino and 9% is of mixed decent or other ethnicity. The sample is also relatively socioeconomically diverse with 21% of the sample reporting a yearly family income below $20,000, 19% of the receiving welfare, and 23% of caregivers with a high school education or less. Eighty percent of MTA participants are male and 20% are female. All participants were between the ages of 7 and 9.9 at study entry (1st through 4th grades) and were diagnosed at baseline with ADHD, Combined Type using Diagnostic and Statistical Manual of Mental Disorders, 4th edition (*DSM-IV*) criteria (American Psychiatric Association, 1994). All parents/children signed informed consent/assent forms approved by the local Institutional Review Boards (IRB). As part of a comprehensive assessment battery completed at baseline, participants' parents completed the HPC.

Measures

Homework Problem Checklist (HPC; Anesko et al., 1987). The HPC includes 20 items that parents rate regarding their child's homework-related behavior. Parents are asked to rate the frequency with which these behaviors occur on 4-point Likert scales ranging from "never" to "very often." Research has shown that the HPC measure has excellent internal consistency for children in 2nd through 4th grades, with alpha coefficients ranging from .90 to .92 and corrected item-total correlations ranging from .31 to .72 (Anesko et al., 1987). HPC ratings completed by parents at baseline in the MTA were examined in this study.

SNAP-IV (Swanson, 1992). ADHD and Oppositional Defiant Disorder (ODD) symptoms were measured using the SNAP-IV Rating Scale. The SNAP includes the 18 ADHD items (9 DSM inattention and 9 DSM hyperactive/impulsive symptoms) and 8 ODD items from the DSM-IV. Parents and teachers respond on a 4-point Likert scale rating the severity of symptoms (i.e., 0 = not at all, 1 = just a little, 2 = pretty much, and 3 = very much). The scale yields ADHD-related factor scores for Inattention, Hyperactivity and Impulsivity and an ODD factor score. Each factor score is derived by summing the items for each symptom domain and dividing by the number of items on each factor (Inattention = 9 items; Hyperactivity = 6 items; Impulsivity = 3 items). Normative data for the SNAP are provided by Swanson (1992). The 18 DSM ADHD items on the SNAP parent version were found to have excellent internal consistency in the MTA sample (Cronbach's alpha = .97).

Statistical Analyses

Given the substantial differences in the Power et al. (2006) sample and the MTA sample (e.g., six sites across the U.S. versus a single site sample) and the fact that the Power et al. factor analysis findings have never been replicated, exploratory factor analysis was selected. As the primary goal of the study was to examine the factor structure reported by Power et al. (2006), the factor analytic statistical procedures utilized by Power et al. were replicated. We utilized common factor analysis as opposed to principal component analysis because we were interested in the underlying latent structure of the HPC. The number of factors to be retained was determined by using a combination of criteria, including visual Scree plot (Keiser criterion; Eigenvalue > 1), MAP (Minimum Average Partials; Velicer, Eaton, & Fava, 2000) and parallel analysis (O'Connor, 2000). Additionally, we looked at sampling adequacy as measured by the Kaiser-Meyer-Olkin (KMO) statistic. The KMO predicts, based on correlation and partial correlation data, whether items are likely to load on distinct factors adequately. The values range from 0 to 1 and with 0.6 or higher serving as a cut-point for proceeding with factor analysis (KMO; Kaiser, 1974). Anticipating correlated

factors, we used oblique rotations and different rotation methods (varimax, equimax and promax) to identify the most interpretable factor structure. Salient factor loadings were defined as those whose values were greater than .40 (Stevens, 2002). In addition, at least three salient item loadings were required to construct a factor (Stevens, 2002). To remain consistent with Power et al. (2006), we used a congruence coefficient (CC) to investigate the similarity of factor structures across racial/ethnic subgroups and sex. Congruence coefficients range in value from 0 to 1 with values of .85 −.94 corresponding to fair similarity across factors and .95 and above indicating the factor structure is virtually identical/equal (Lorenzo-Seva & Berge, 2006).

Results

The overall KMO (Kaiser, 1974) statistic for all of the HPC items was .93 and ranged from .89 − .95 across the individual items. Examination of the correlation matrix revealed that most correlations were greater than .30. Initially, based on the Keiser criteria, a 3-factor solution was extracted. However, both the MAP and parallel analysis indicated that only two factors were needed. A two factor solution was also supported because only two variables (items 16 and 17) loaded on the third factor suggested by the Keiser criteria. Therefore, the third factor was eliminated and all further analyses using a variety of different rotation methods produced a 2-factor solution. As with Power et al. (2006), Principal Factor extraction was used for all subsequent analyses followed by Promax rotation.

The two factors accounted for 50% of the variance. Twelve items loaded on Factor I (Cronbach's alpha = .92) and seven items loaded on Factor II (Cronbach's alpha = .86). The correlation between the two factors was .66 (p<.0001). There were no cross-loadings (i.e., loadings greater than .40 on two factors), but items 4, 17, and 18 did not load well on either factor (see Table 1). Factor loadings for item 4 (.392 on Factor II) and 17 (.392 on Factor I) approached .4 in this study (see Table 1) and reached the .4 cutoff in the Power et al. (2006) general education sample. Item 18 did not load well on either factor in this study or in the Power et al. (2006) study. Accordingly, from this point forward, item 4 was included in calculating the Factor II score, item 17 in calculating the Factor I score, and item 18 was only included when calculating the HPC Total Score. We calculated the HPC Total Score and presented means and standard deviations in the tables primarily to allow comparisons with previous research.

Ethnic Differences

The two factor structure of the HPC was examined across racial and ethnic subgroups (Caucasian N = 344; African American N = 109; Latino N = 40; Other N = 70). When compared across ethnicity, the CCs ranged from .95 − .97 for HPC Factor I and from .90 to .98 for HPC Factor II indicating that the two factor structure fit similarly across ethnicity. An ANOVA testing for differences in the severity of homework problems by each category of ethnicity was not significant (p = .17; see Table 2).

Sex and Grade Differences

The sample was divided into male (N = 464) and female (N = 115). A two factor solution was generated and similarity of factor structure across sex was measured using a CC. The CC was .99 for HPC Factor I and .96 for HPC Factor II between the two samples (male and female), indicating that the two factor structures were virtually identical. Males were rated as exhibiting more severe homework problems than females for HPC Factor II (p<.05) but not for HPC Factor I (p = .07). Cohen's d effect size calculations revealed that the differences between males and females on homework problem ratings were small (Factor II

Male *M* = 8.68 & Female *M* = 7.57, *d* = .22; Factor I Male M = 24.47 & Female M = 22.92, *d* = .19).

The sample was next divided by grade in school (1st grade *N* = 93; 2nd grade *N* = 230; 3rd grade *N* = 170; 4th grade *N* = 70). An ANOVA conducted using the HPC Factors I and II as the dependent variables revealed a significant effect of grade ($p<.01$). Homework problems ratings were highest (i.e. most problems) in grade 4 and lowest in grade 1 (see Table 3). Pairwise comparisons revealed that participants in grades 3 and 4 had significantly more homework problems than children in grades 1 and 2 ($p<.05$) for both HPC Factor I and Factor II. There was no significant difference between children in grades 1 and 2 or between children in grades 3 and 4. Cohen's *d* effect size analyses revealed that the difference in homework problems between children in grade 1 and grade 4 was moderate (Factor I *d* = .37; Factor II *d* = .47).

Correlations between HPC Factors and ADHD/ODD Symptoms

For these correlational analyses, the SNAP Inattention, Hyperactivity, Impulsivity, and ODD scores were each separately correlated with the two HPC factors. Similar to Power et al., (2006), both HPC Factors had moderate to high correlations with parent ratings of inattention and low to moderate correlations with parent ratings of impulsivity and hyperactivity (all *ps*<.0001; see Table 4). The correlations between HPC Factors I and II and teacher ratings of inattention were lower but significant ($p<.001$). Teacher ratings of hyperactivity and impulsivity were not correlated with parent ratings of homework problems (see Table 3). Also similar to Power et al. (2006), both HPC Factors had moderate correlations with parent ratings of ODD symptoms ($p<.0001$). Teacher ratings of ODD had small correlations with HPC Factor II ($p<.01$) and were not significantly correlated with HPC Factor I.

ADHD/LD Comorbidity

Current best-practice recommendations for diagnosing a LD include documentation of an academic skills deficit as measured by a norm-referenced academic achievement test. An academic skills deficit is defined as a score of more than one standard deviation below the mean (a standardized score of 85 or below on most norm-referenced achievement tests; Dombrowski, Kamphaus, & Reynolds, 2004). All participants in the MTA were administered the Wechsler Individual Achievement Test (WIAT; Wechsler, 1992) Reading, Math, and Spelling subtests at baseline. When LD is diagnosed on the basis of a score at or below 85 on one or more of these subtests, about one-third of the children in the MTA sample are identified (Swanson et al., 2000), which is consistent with prevalence rates of ADHD/LD comorbidity (DuPaul & Stoner, 2003). Dombrowski et al. (2004) specified a number of additional criteria that should be assessed as part of a comprehensive LD evaluation, including educational impairment and alternative explanations (e.g. cultural or economic factors). As children in this sample were diagnosed solely upon the < 85 criterion, they should be considered potential LD, rather than as meeting full diagnostic criteria for a LD. Using this definition, 192 participants (33% of sample) met criteria for at least one of the three types of LD. The male to female ratio for the LD sample mirrored the overall MTA sample (19% female). Sixty-five participants met criteria for two different types of LD and 42 participants met for all three types. For the analyses, participants who met for more than one type of LD were included in each group that they met criteria. Overall, *N* = 108 students met criteria for a potential Reading Disability (RD), *N* = 95 students for potential Math (MD), and *N* = 128 students for potential Spelling (SD).

An ANCOVA was conducted in order to control for participants' Full Scale IQ as assessed by the WISC-III (Wechsler, 1991). Children with ADHD/RD and ADHD/SD had

significantly more homework problems than children with ADHD alone on both HPC Factors I and II after controlling for Full Scale IQ ($p<.05$). The difference between parent-ratings of homework problems in children with ADHD alone in comparison to children with ADHD/RD (Factor I $d = .29$; Factor II $d = .34$) and ADHD/SD (Factor I $d = .26$; Factor II $d = .28$) was small. Children with ADHD/MD did not have more homework problems than children with ADHD alone for HPC Factor I ($p=.25$) but did for HPC Factor II ($p<.05$; $d = .20$; see Table 5). ANCOVA's were also conducted using the HPC Total Score for comparison with prior research. Children with comorbid ADHD/RD ($d = .34$) and ADHD/SD ($d = .30$) were rated as having significantly more homework problems as measured by the HPC Total Score than children with ADHD alone after controlling for Full Scale IQ ($p<.01$). There was no significant difference in parent-ratings of homework problems for children with ADHD alone as compared to children with ADHD/MD.

Discussion

The results of an exploratory factor analysis with a geographically and ethnically diverse sample of elementary school-aged students with ADHD support the findings from Power et al. (2006): the items of the HPC are best described by two distinct factors that measure homework completion behaviors and homework management behaviors. When examined across race and ethnic subgroups and across sex, the HPC two-factor solution was virtually identical. The similarity in findings between this study and the Power et al. (2006) study are remarkable in light of the significant differences between the two samples in relation to both sample diversity (MTA = six sites across U.S. & Power et al. = one clinic in Northeast; MTA = 38% minority & Power et al. = 19% minority) and participant diagnosis (MTA sample = 100% ADHD Combined Type & Power et al. = 75% ADHD with 28% Combined Type).

In both the present study and the Power et al. (2006) study, item 18 did not load well on either factor and items 4 and 17 had marginal loadings around .4. Item 4 "refuses to do homework assignments" loaded best on Factor II in both our study and in the Power et al. study. The loading of item 17 "hurries and makes careless mistakes" was sample dependent (i.e. general education or clinic) in the Power et al. (2006) study. Item 17 loaded on Factor I in the present study and in the Power et al. general education sample. Further, the item fits best conceptually with Factor I as the behavior "hurries and makes careless mistakes" occurs during the process of homework completion. Accordingly, future studies with the HPC should include item 4 in calculating the Factor II score and item 17 when calculating the Factor I score. Given the low loadings for item 18 ("dissatisfied with work, even when does a good job") in both studies (the only item on HPC below .3 in both studies), it should not be included when calculating either factor and could either be: 1) dropped from the measure; 2) reworded; or 3) included only in calculating the HPC Total Score. Given that a substantial amount of previous research has included item 18 in calculating the HPC Total Score (e.g. Lahey et al., 1994; Langberg et al., 2008; Power et al., 2006), our recommendation is for future studies to continue including item 18 in calculating the HPC Total Score. This strategy should aid in interpretation of findings across studies.

Parent ratings of African American and Latino children did not differ from parent ratings of Caucasian children in homework problem severity (see Table 2) and the difference between boys and girls was small to negligible. Further, the two factor structure of the HPC was virtually identical when examined across ethnic subgroups and child sex. The lack of differences across ethnic subgroups and sex could be a function of the MTA sample including only children with ADHD Combined Type. Specifically, variability in homework problems was likely reduced because all children in the sample were referred for ADHD and associated impairments, which typically include poor school performance. Previous research

has shown that the African American/Caucasian achievement gap is mediated by higher rates of attention difficulties among African Americans (Rabiner, Murray, Schmid, & Malone, 2004). In fact, Rabiner et al. (2004) found that almost half of teacher-rated achievement differences were explained by the presence of attention problems. Accordingly, potential variability in homework problems across ethnic subgroups was likely limited because all children in MTA, by definition, had high rates of attention problems. This hypothesis is further supported by the fact that across studies with the HPC, the difference between boys and girls is larger in general education samples than in samples of children with attention problems (Anesko et al., 1987 & Power et al., 2006).

Anesko et al. (1987) and Power et al. (2006) reported negligible differences in ratings of homework problem severity as a function of grade in school. In contrast, we found that homework problems increased significantly as a function of grade in school and that the difference in homework problems between the 1st and 4th grades was moderate (Factor I *d* = .37; Factor II *d* = .47; see Table 3). One possible explanation for the discrepancy is that Power et al. (2006) only examined the impact of grade in the general education sample and not in the sample of children with ADHD and the Anesko et al. (1987) sample was general education. It may be that the pattern of increasing homework problems with grade in school is only evident for children with learning and behavior problems such as ADHD.

As children progress through school numerous environmental changes occur, including increased demands for independence and greater academic workloads (Evans, Langberg, Raggi, Allen & Buvinger, 2005; Langberg et al., 2008). In particular, more homework is assigned in higher grades and students spend greater amounts of time completing homework (Campbell et al., 1996). The relationship between higher grade in school and increased homework problems may be a function of a deficit x environment interaction, an interaction that does not occur for children without certain deficits or difficulties. That is, it may become steadily more difficult for children with ADHD to compensate for certain deficits (e.g. difficulties with focus and materials management) and to be successful with homework as academic expectations increase. Children without these difficulties may be better able to adjust and may even become more adept with practice and challenge. After all, the homework and academic challenges that increase with grade level are designed to promote learning for the average child. It is interesting to note that the relationship between homework and academic achievement gets stronger as children progress through school and is strongest in secondary school (Cooper et al., 2006). This may be partially explained by the fact that certain subsets of children experience steady increases in homework problems which subsequently impacts academic achievement to a greater extent.

Similar to Power et al. (2006), we found that both HPC factors were highly correlated with parent ratings of inattention and that correlations with parent ratings of hyperactivity and impulsivity and teacher ratings of inattention were low to moderate (see Table 3). Lahey et al. (1994) reported similar findings as part of the DSM-IV field trials for children with ADHD. Specifically, symptoms of inattention predicted the parent-completed HPC but symptoms of hyperactivity/impulsivity did not. Further, children with Combined Type and Inattentive Type had significantly more homework problems than children with Hyperactive/Impulsive Type (Lahey et al., 1994). This finding has also been replicated with other indices of academic functioning, including grade point average (Molina, Smith & Pelham, 2001) and standardized achievement test scores (Massetti et al., 2008; Molina et al., 2001). The strong relationship between academic functioning and ADHD symptoms of inattention may partially explain why the academic impairments of children with ADHD persist over time. Specifically, most ADHD symptom trajectory studies have found that while symptoms of hyperactivity and impulsivity decline during adolescence symptoms of inattention persist (Biederman, Mick, & Faraone, 2000; Hart et al., 1995).

We found that children with ADHD and below average reading or spelling achievement test scores exhibited significantly more Factor I and Factor II homework problems than did children with ADHD alone (see Table 5). Children with below average math achievement test scores also had more homework problems on Factor II than did children with ADHD alone. ADHD and LD are highly comorbid with approximately 30% of children with ADHD also meeting criteria for LD (DuPaul & Stoner, 2003). There is a growing body of evidence demonstrating that comorbid ADHD/LD is associated with increased functional impairment in a number of areas above and beyond what is typical of either disorder alone (e.g., Mayes et al., 2000; McNamara et al., 2005). This effect of additive functional impairment may have implications for homework interventions. Children with ADHD/LD will likely require a combination of direct instruction targeting academic skills and behavioral intervention targeting homework management and completion behaviors.

Despite high rates of comorbidity and increased risk for negative outcomes, almost no research has been published on the efficacy of psychosocial or pharmacological interventions for children with comorbid ADHD/LD. Children with a LD have deficits in core skills such as reading, math, and writing that may not be improved with medication (MTA Cooperative Group, 1999) or with psychosocial interventions that target homework management and organization of materials (e.g. Langberg et al., 2008; Power et al., 2001). One of the few studies to evaluate the efficacy of stimulant medications for children with ADHD/LD found that 55% of children with comorbid ADHD/LD made significant improvements on methylphenidate as compared to 75% of children with ADHD alone (Grizenko, Bhat, Schwartz, Ter-Stepanian, & Joober, 2006). These preliminary findings suggest that traditional ADHD interventions may not be as effective for children with ADHD/LD and that further intervention development research is needed.

Limitations

The HPC is a parent completed measure. Teachers can undoubtedly provide unique and valuable information as part of a homework assessment. For example, teachers may be able to more accurately rate a child's consistency with recording homework assignments, bringing homework assignments to class, and keeping homework materials organized in a locker or desk. Another limitation is that some of the HPC items overlap with symptoms of ADHD making it hard to measure the constructs independently. Recently, a teacher-report measure of homework problems was developed (Power, Dombrowski, Watkins, Mautone, & Eagle, 2007). This measure, the Homework Performance Questionnaire (HPQ), has both parent and teacher versions and items do not directly overlap with ADHD symptoms. Future research on homework problem assessment and/or intervention should seek to use a multi-informant approach.

We did not find differences in homework problems as a function of ethnicity. While African American and Latino children have historically experienced less academic success and lower academic proficiency when compared to Caucasian children, this is largely attributable to differences in socioeconomic backgrounds (Tucker & Herman, 2002; NCES, 2001). With 77% of caregivers in the MTA sample having at least some college education, the sample may have lacked the SES diversity necessary to detect differences in homework problems.

Clinical Implications

This research confirms the Power et al. (2006) finding that homework performance is not a unitary construct. This finding has implications for interventions targeting homework problems. Factor I on the HPC relates to problems that occur during homework completion. For example, parents rate their child's efficiency of work completion, distractibility,

inattention, and the parent-child interactions that occur during homework completion. For children with high scores on Factor I, behavioral interventions that teach parents techniques directly related to these problems are likely to be effective (e.g., Power et al., 2001). For example, parents should be taught strategies for structuring the homework environment (e.g. selecting a quiet location to minimize distractions), providing effective instructions, and setting up reward systems to encourage on-task behavior. It is evident from numerous studies that medication produces marked reductions in symptoms of inattention and distractibility. Accordingly, stimulant medication, and particularly a late afternoon dose, would likely produce marked improvements in the inattention and distractibility aspects of homework measured by Factor I.

Factor II on the HPC relates predominately to behaviors that take place outside of actual homework completion time. Most of the items relate to organization and management of homework materials (e.g. does not know what homework has been assigned, fails to bring home assignments, and forgets to bring assignments back to class). For children with high scores on Factor II, behavioral interventions that teach children and families materials organization and homework management skills are likely to be most effective (e.g., Evans, Langberg, Raggi, Allen & Buvinger, 2005; Langberg, Epstein, Altaye et al., 2008). Stimulant medication may serve to improve some aspects measured by HPC Factor II, but likely not all. For example, medication may improve forgetfulness, but does not teach children skills related to organizing their school materials, planning for tests/projects, accurately recording homework assignments and it does not improve parent-teacher communication. A recent study of the MTA treatments supports this assertion. Specifically, children with ADHD in a medication only group improved significantly on HPC Factor I relative to children in a community control but did improve on HPC Factor II relative to the community control (Langberg et al., in press).

In sum, the two-factor solution for the HPC has now been demonstrated in two separate samples. Clinicians are encouraged to utilize the HPC to assess students' homework completion and homework management problems and to use the factor scores to determine the most appropriate avenues for intervention. Future research should be conducted on the predictive utility of this measure. Specifically, parent ratings of early childhood homework problems may be predictive of later academic underachievement. In particular, studies are needed that examine the relationship between parent-rated homework problems and grades in school.

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Table 1

Pattern Coefficients and Communalities Using Principal Axis Extraction and Promax Rotation

Item No.	Item Description	Factor I	Factor II	Communality
1	Fails to bring home assignments and materials	0.003	**0.694**	0.484
2	Doesn't know exactly what has been assigned	0.187	**0.579**	0.492
3	Denies having homework assignment	0.046	**0.732**	0.576
4	Refuses to do homework assignment	0.333	*0.392*	0.412
5	Whines or complains about homework	**0.653**	0.084	0.495
6	Must be reminded to sit down and start homework	**0.789**	−0.033	0.593
7	Puts off doing homework, waits until last minute	**0.731**	0.082	0.608
8	Doesn't do homework unless someone is in the room	**0.834**	−0.007	0.688
9	Doesn't do homework unless someone does it with him/her	**0.810**	−0.044	0.619
10	Daydreams or plays with objects	**0.814**	−0.062	0.610
11	Easily distracted by noises or activities of others	**0.603**	−0.037	0.340
12	Easily frustrated by homework assignment	**0.724**	0.050	0.568
13	Fails to complete homework	0.266	**0.587**	0.591
14	Takes unusually long time to do homework	**0.717**	0.091	0.596
15	Responds poorly when told to correct homework	**0.616**	0.081	0.442
16	Produces messy or sloppy homework	**0.460**	0.229	0.383
17	Hurries and makes careless mistakes	*0.392*	0.283	0.359
18	Dissatisfied with work, even when does a good job	0.210	0.276	0.186
19	Forgets to bring assignment back to class	−0.049	**0.712**	0.470
20	Deliberately fails to bring assignment back to class	−0.129	**0.701**	0.406

Note: Boldface indicates salient pattern coefficient (≥.40). Italics indicate items that approached the significant loading cutoff (.40) and that met the .4 threshold on these factors in the general education sample of the Power et al. (2006) study.

Table 2

Comparison of Means and Standard Deviations of Parent-Rated Homework Problems by Ethnic Subgroup

HPC Score	Caucasian *M (SD)*	African American *M (SD)*	Latino *M (SD)*	Other *M (SD)*
Factor I	24.52 (7.86)	22.62 (8.52)	24.18 (8.72)	24.81 (8.22)
Factor II	8.16 (4.97)	8.89 (5.74)	8.85 (5.64)	9.00 (5.61)
Total Score	32.68 (12.83)	31.51 (14.26)	30.03 (14.36)	33.81 (13.83)

Note: ANOVA was not significant across subgroups; $p = 0.17$

Table 3

Comparison of Means and Standard Deviations of Parent-Rated Homework Problems by Grade in School

HPC Score	First Grade *M (SD)*	Second Grade *M (SD)*	Third Grade *M (SD)*	Fourth Grade *M (SD)*
Factor I	23.04 (8.54)	23.25 (8.25)	25.29 (7.42)	26.17 (8.22)
Factor II	7.74 (5.20)	7.55 (4.84)	9.32 (5.18)	10.27 (5.60)
Total Score	30.79 (13.74)	30.80 (13.09)	34.52 (12.60)	36.44 (13.83)

Note: Grades 4 & 3 > Grades 1 & 2; $p<.05$; Total Score = Sum of items; Item mean = Average item score

Table 4

Correlation between SNAP and HPC Factor Scores

SNAP Score	HPC Factor I	HPC Factor II
Parent		
Inattention	0.60***	0.50***
Hyperactivity	0.34***	0.31***
Impulsivity	0.29***	0.30***
Oppositional Defiant	0.29***	0.34***
Teacher		
Inattention	0.18***	0.20***
Hyperactivity	−0.08	−0.01
Impulsivity	−0.09*	−0.01
Oppositional Defiant	−0.06	0.12**

Note:

* p<.05

** p<.01

*** p<.0001

Table 5

Comparison of Means and Standard Deviations of Parent-Rated Homework Problems by ADHD/LD Status

HPC Score	ADHD/RD *M(SD)*	ADHD/MD *M(SD)*	ADHD/SD *M(SD)*	ADHD Alone *M(SD)*
Factor I	26.00 (7.30)	25.44 (7.37)	25.74 (7.02)	23.77 (8.20)
Factor II	9.91 (5.55)	9.36 (7.37)	9.63 (5.48)	8.13 (5.05)
Total Score	35.98 (11.57)	34.91 (14.14)	35.45 (11.15)	31.96 (12.15)

Note: RD = potential Reading Disability; MD = potential Math Disability; SD = potential Spelling Disability; ADHD/RD & ADHD/SD > ADHD Alone for HPC Factors I & II and Total Score ($p<.05$); ADHD/MD > ADHD Alone only for HPC Factor II ($p<.05$)